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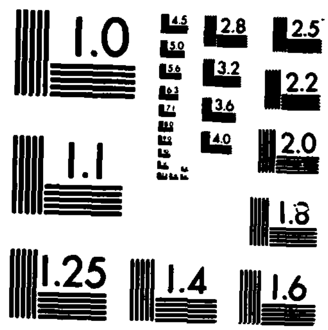

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ABSTRACT

This thesis examines the legal issues and implications of the ITU Space WARC. In order to understand these issues, knowledge of the geostationary orbit, the frequency spectrum, and satellite technology is necessary; Chapter 1 addresses these subjects. The institutional framework and the parties to the WARC are reviewed in Chapter 2. Chapter 3 examines the current regulatory regime of the geostationary orbit. It highlights the aspects most unacceptable to developing countries. Chapter 4 reviews the events leading to the WARC. Chapter 5 focuses on planning. Current and proposed planning methods, and the opposing views of planning are surveyed. Chapter 6 analyzes the legal status of the geostationary orbit and fundamental principles of space law. Those principles are then applied to the current and proposed regimes of the geostationary orbit. The mandate of the WARC is the subject of Chapter 7; "equitable access" and the scope and powers of the WARC are examined. Conclusions are discussed in Chapter 8.

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SPACE WARC 1985 -
LEGAL ISSUES AND IMPLICATIONS

by

Milton L. Smith III

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Laws (LL.M.)

Institute of Air and Space Law
McGill University
Montreal, P.Q., Canada

November, 1984

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This thesis examines the legal issues and implications of the ITU Space WARC. In order to understand these issues, knowledge of the geostationary orbit, the frequency spectrum, and satellite technology is necessary; Chapter 1 addresses these subjects. The institutional framework and the parties to the WARC are reviewed in Chapter 2. Chapter 3 examines the current regulatory regime of the geostationary orbit. It highlights the aspects most unacceptable to developing countries. Chapter 4 reviews the events leading to the WARC. Chapter 5 focuses on planning. Current and proposed planning methods, and the opposing views of planning are surveyed. Chapter 6 analyzes the legal status of the geostationary orbit and fundamental principles of space law. Those principles are then applied to the current and proposed regimes of the geostationary orbit. The mandate of the WARC is the subject of Chapter 7; "equitable access" and the scope and powers of the WARC are examined. Conclusions are discussed in Chapter 8.

RÉSUMÉ

Cette thèse analyse les aspects juridiques et les implications des Conférences administratives mondiales de radio (CAMR) spatiales de l'U.I.T. Afin de bien comprendre ces questions, il est nécessaire d'étudier d'abord l'orbite géostationnaire, le spectre des fréquences et la technologie reliée aux satellites. Le chapitre 1 définira ces thèmes. Le chapitre 2 traitera du cadre institutionnel et des membres participant aux CAMR. Le chapitre 3 présentera la réglementation qui régit actuellement l'orbite géostationnaire, et soulignera les dispositions défavorables aux pays en voie de développement. Le chapitre 4 rappellera les événements ayant mené à ces conférences. Le chapitre 5 se penchera essentiellement sur la planification de ce service et analysera les méthodes proposées, celles qui existent déjà, et les critiques qu'elles ont soulevées. Le chapitre 6 examinera le statut juridique de l'orbite géostationnaire et les principes de droit spatial s'y référant. Ces principes seront par la suite appliqués aux régimes juridiques actuels et proposés de l'orbite géostationnaire. Le chapitre 7 tiendra compte du mandat et de l'ampleur des pouvoirs des Conférences administratives mondiales de radio, surtout au niveau de l'accès équitable au spectre des fréquences de l'orbite géostationnaire. Le chapitre 8 contiendra les conclusions à cette dissertation juridique.

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INTRODUCTION

In August 1985, the International Telecommunication Union (ITU) will hold the World Administrative Radio Conference (WARC) on the use of the geostationary-satellite orbit and the planning of the space services which utilize it. This Conference is known as the Space WARC. Although the WARC's scope is broad enough to include all uses of the geostationary orbit, its focus will be on use of the orbit for telecommunication satellites. In fact, this WARC could be one of the most significant telecommunication events since the dawn of the space age.

It has been over twenty years since the first satellite provided a communication link from the geostationary orbit. In that time, world communications have been transformed by the use of satellites. This resulted in an increasing awareness of the value of satellite telecommunication systems. As that awareness grew, so did use of the two resources necessary for satellite telecommunications: the geostationary orbit, and the radio frequency spectrum; together known as the orbit/spectrum resource.

Technological advancement has resulted in increasingly efficient use of the orbit/spectrum resource. But as the demands placed upon that resource increased, many nations, especially developing nations, became concerned that the capacity of the resource might be reached or access to it made prohibitively expensive. Those countries are particularly dissatisfied with the regulatory regime governing use of the orbit/spectrum resource. They consider it to be inherently discriminatory because, in their opinion, it protects early users of the orbit/spectrum resource and penalizes later users.

Dissatisfaction with the current ITU regulatory regime ultimately resulted in the call for the Space WARC. Its objective is to "guarantee in practice, for all countries, equitable access to the geostationary-satellite orbit and the frequency bands allocated to space services . . ."[1] The developing countries generally believe the best way to do this is pursuant to a plan which partitions the orbit/spectrum resource and allots portions of it to each country. The developed countries, on the other hand, generally favor the current regime and believe such a plan would retard technological advancement and waste unused portions of the orbit/spectrum resource. Thus, the potential exists for a confrontation between the developing countries, that have the majority of the votes within the ITU, and the developed

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1. ITU, Radio Regulations, Resolution No. 3, ITU Doc. No. ISBN92-61-01221-3, Geneva, (1982) [hereinafter cited as 1982 Radio Regulations].

countries, that have the technology and other necessary resources. The result of this confrontation could be a sweeping revision of the ITU regulatory regime for use of the geostationary orbit by telecommunication satellites. Such potential raises significant legal issues. The purpose of this thesis is to examine those legal issues and their implications.

The legal issues relating to the Space WARC are a combination of two distinct bodies of law. Since the geostationary orbit is in outer space, international space law is relevant. In addition, because the radio frequency spectrum is the means by which use is made of the geostationary orbit, telecommunications law is also applicable. This thesis examines both of these legal regimes. Additionally, any analysis of the Space WARC must address technological and policy issues. A nexus between technology, policy and the law exists for most uses of outer space; space telecommunications is no exception. Therefore this thesis examines not only legal issues, but also the issues of technology and policy that surround them.

Chapter 1

THE GEOSTATIONARY ORBIT, THE RADIO FREQUENCY SPECTRUM, AND THE TECHNOLOGY OF SATELLITE TELECOMMUNICATIONS: AN OVERVIEW

1.1 The Geostationary Orbit/Spectrum Resource: A "Limited Natural Resource"

Radio frequencies and the geostationary satellite orbit have been declared by Treaty to be "limited natural resources".[2] In practice, these resources must be used together and are referred to as the geostationary orbit/spectrum resource. It is important to understand why that resource is also limited.

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2. ITU, International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, Art. 33, Nairobi (1982) (ITU Doc. No. ISBN 92-61-01651-0) [hereinafter cited as 1982 ITU Convention].

To do so, the limits of its components and their interaction must be examined.

1.1.1 The Geostationary Orbit - Uses and Limitations

A satellite that orbits the earth above the equator at an altitude of approximately 36,000 Km (22,300 mi) will have a period of revolution approximately equal to that of the earth. Because the satellite revolves at the same rate as the earth, when viewed from the earth, it appears to be motionless and stationary relative to the viewing point. Such a satellite is called a geostationary satellite, and the path it follows is the geostationary orbit.[3]

The geostationary orbit is actually a band around the earth with three dimensions and a finite volume. Additionally, a

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3. The relevant definitions in the Radio Regulations are:

Geosynchronous Satellite: "An earth satellite whose period of revolution is equal to the period of rotation of the Earth about its axis." 1982 Radio Regulations, supra n. 1, Art. 8, No. 180.

Geostationary Satellite: "A geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's equator and which thus remains fixed relative to the Earth . . ." Id. No. 181.

Geostationary-satellite orbit: "The orbit in which a satellite must be placed to be a geostationary satellite." Id. No. 182.

geostationary satellite is not exactly stationary. Because of numerous forces which act upon it, a geostationary satellite moves in a figure-eight pattern within the orbit volume.[4] As a result of these forces, station-keeping maneuvers must be periodically executed for the satellite to maintain its nominal position. With current technology, a satellite can be maintained within 0.1 degree of its nominal orbital location on the equatorial plane. This results in the satellite moving within an area of about 150 km on each side, at an altitude that varies by about 30 Km. Thus, the geostationary orbit is a band around the equator 30 Km thick, 150 Km wide and 36,000 Km out in space.[5]

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4. Various forces act upon geostationary satellites. The first is man-made. It consists of the launch propulsion and the station-keeping propulsion which is used to keep the satellite in its proper location. The others are natural and include: the attraction of the mass of the earth, the oblateness of the earth, the ellipticity of the equator, the attraction of the moon and sun, and solar radiation pressure. See U.N., Physical Nature and Technical Attributes of the Geostationary Orbit, U.N. Doc. A/AC.105/203 at 4-6 (Aug., 29, 1977) [hereinafter cited as the Geostationary Orbit]; and Perek, Physics, Uses and Regulation of the Geostationary Orbit, or, Ex Facto Sequitur Lex, XX Colloquium 400, 402-03 (1977).

5. U.N. Efficient Use of the Geostationary Orbit at 5, U.N. Doc. A/CONF. 101/BP/7 (1981) [hereinafter cited as U.N. Doc. BP/7]; and Perek, supra n. 4, at 403. If station-keeping stops, the satellite will begin to drift out of this band and will no longer remain stationary. Therefore, one of the factors limiting a geostationary satellite's useful life is the amount of fuel it can carry for station-keeping propulsion. See also ITU, Factors Affecting Station-Keeping of Geostationary Satellites of the Fixed Satellite Service, CCIR Report 556-1 (1978).

There are many space "services"[6] which use the geostationary orbit. Only a few of these currently have, or plan to have a significant number of geostationary satellites. Currently, the major use of the geostationary orbit is for telecommunication satellites.[7] From the geostationary orbit, a satellite can have line-of-sight communication with almost one-third of the earth.[8] One satellite can cover all areas of almost any country. Moreover, a system of three satellites can provide continuous global coverage. Thus, a geostationary satellite

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6. A "service" is defined as "the transmission, emission and/or reception of radio waves for specific telecommunication purposes." 1982 Radio Regulations, supra n. 1, Art. 1, No. 20. Some 37 different services, including 17 different space services, are defined in the Radio Regulations. Id. Art. 1, Nos. 20 - 57. Services follow a functional breakdown (broadcasting, meteorological, etc.) and a breakdown by type of earth terminal (fixed, mobile, maritime mobile, aeronautical mobile). In the future, use of digital signals, which are technically identical regardless of service, may render service-based allocations obsolete. See Rothblatt, International Cooperation in Regulating 12 GHz Band Geostationary Satellite Communications: Technology, Geopolitics and the Common Heritage of Mankind, 23 Colloquium 189 (1980).

7. Other satellites which use the geostationary orbit include meteorological and space research satellites. Their numbers are few, and none present significant prospects for congestion of the geostationary orbit/spectrum resource. U.N. Doc. BP/7, supra n. 5, at 10-11.

8. Very low elevation angles from the earth station to the satellite greatly increase interference. Therefore, areas of high northern or southern latitudes cannot be served by a satellite in the geostationary orbit. Sawitz, Spectrum-Orbit Utilization, An Overview, National Telecommunications Conference, at 43-1 (Dec., 1975).

can be an important link in domestic and international telecommunications networks.

Geostationary satellites are also generally the least expensive telecommunication satellite system available. Although telecommunication satellites can operate in other orbits, they are not always at a fixed position relative to a point on the earth. This has two significant consequences. First, for continuous communication to and from a particular point on earth, more than one satellite is needed.[9] Second, earth stations with steerable antenna are required to track the satellites across the sky. This results in significantly more complicated and more expensive earth stations. Due to these factors, satellites in the geostationary orbit offer the best method of satellite telecommunication.[10]

There are three telecommunication satellite services; all use the geostationary orbit. The largest user by far is the "fixed

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9. The non-geostationary system used by the USSR, for example, has 12 satellites, and is the only non-geostationary telecommunication satellite system in use today. See _infra_ n. 201. This system is needed by the USSR due to their extensive northern areas which cannot be served by geostationary satellites. See _supra_ n. 8.

10. Geostationary telecommunication satellites also have a longer life expectancy than satellites in other orbits, primarily because they do not have to cross the Van Allen radiation belt every orbit. See N.M. Matte, _Aerospace Law: From Scientific Exploration to Commercial Utilization_, 86 (1977).

satellite service" (FSS). This service is for communication via satellite between fixed earth stations.[11] It was the first type of satellite telecommunication system developed. The FSS carries television, telephone, telegraphic and telex traffic, and has the capability to carry other types of information.[12]

Another telecommunication satellite service, the "mobile satellite service" (MSS), is for communication between earth stations located on ships, aircraft and land vehicles.[13] Since the earth stations must be small, the satellites need to be more powerful and complex.[14] This service has progressed slowly, and aeronautical service is still in the development period.[15] The traffic volume and frequency requirements for this service are considerably less than for the FSS.[16]

The remaining telecommunications satellite service is the "broadcasting satellite service" (BSS).[17] This service carries

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11. 1982 Radio Regulations, supra n. 1, Art. 1, No. 22. The FSS is sometimes referred to as "point-to-point" service.

12. See U.N.Doc. BP/7, supra n. 5, at 9.

13. 1982 Radio Regulations, supra n. 1, Art. 1, Nos. 29, 31 & 35.

14. See discussion infra n. 62 and accompanying text.

15. See U.N.Doc. BP/7, supra n. 5, at 9.

16. Id.

17. 1982 Radio Regulations, supra n. 1, Art. 1, No. 37.

television or radio signals, via satellite, from a fixed earth station to large numbers of small, inexpensive receiving stations. Since the receiving earth stations must be small, and simple, this service must also use relatively powerful satellites.[18] Although there are currently no operational systems, experimental systems have been established, and several systems are being planned.[19]

Given the importance of telecommunication satellites, and their practical need to use the geostationary orbit, it is important to explore the physical capacity of the orbit. Any orbit may contain only a particular number of satellites until it is physically saturated. An orbit is saturated when it is impossible to insert a new satellite without significantly increasing the probability of collision.[20] In May, 1984, there were 115 operational satellites in the geostationary orbit and 160 in various stages of planning.[21] Theoretically, with the current station-keeping accuracy of 0.1 degree,[22] 1,800 satellites could be uniformly spaced in the 360 degrees of the

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18. See U.N.Doc. BP/7, _supra_ n. 5, at 9.

19. _Id_.

20. Perek, _supra_ n. 4, at 404.

21. Kimball, _Implications for the Future of Satellite Communications_, at 2, paper presented to IIC 1984 Annual Conference, Berlin (Sept. 21-23, 1984).

22. See _supra_ n. 5 and accompanying text.

geostationary arc without risk of collision.[23] This theoretical calculation, however, has two major weaknesses.

First, not all locations in the geostationary orbit are equally useful. Certain areas are much more valuable for telecommunication purposes than are others. Satellites over the Atlantic Ocean relay communications between Europe and North America. Satellites over the Indian and Pacific Oceans also relay communications between continents. Additionally, satellites over north America can cover all areas of the continental U.S. These four locations are the most intensively used areas of the geostationary orbit.[24] Important areas like *these often have more than one satellite assigned to a single* orbital location.[25] Because geostationary telecommunications satellites are concentrated in certain areas of the orbital arc, a calculation based on uniform spacing is misleading.

Second, a theoretical calculation based on station-keeping of active satellites ignores the increasing problem of space

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23. U.N. Doc. BP/7, *supra* n. 5, at 19.

24. *Id*.

25. The Geostationary Orbit, *supra* n. 4, Add.4 at 7 (1983). "There is no required minimum separation between orbital positions of space stations as they are registered by [the] IFRB. Sometimes the same position is assigned to several stations." *Id*. Satellites in the same orbital location must use different frequencies to avoid interference (see *infra* n. 40 and accompanying text), or serve geographically separated areas. See *infra* n. 54 & 55 and accompanying text.

debris. This term describes the collection of man-made objects, other than functioning satellites, which inhabit the geostationary orbit. Included are non-functioning satellites, spent rocket stages, and various parts which go into orbit along with satellites.[26] Presently, the danger of collision with space debris is small, but it has been recognized as "a problem that is likely to become more serious in [the] future."[27]

In conclusion, it is generally accepted that the danger of collision is very remote and that orbital saturation is not a

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26. Menter, Space Objects: Identification, Regulation and Control, John Bassett Moore Society of International Law, Symposium on International Law and the Environment, Panel on Space Debris (Oct. 20, 1978).

27. U.N., Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, at 70, Vienna (Aug. 9-21, 1982) [hereinafter cited as UNISPACE 82]. For a further discussion of the issue of space debris see generally, Olmstead, Orbital Debris Management: International Cooperation for the Control of a Growing Safety Hazard, 34th Congress of the IAF, (Oct., 1983); Gordon, Toward International Control of the Problem of Space Debris, XXV Colloquium 63 (1982); and Diederiks-Verschoor, Harm Producing Events Caused by Fragments of Space Objects (Debris), XXV Colloquium 1 (1982). While the issue of space debris will not be significant at the Space WARC, it is clearly an issue that needs to be addressed while the problem is manageable. The UNISPACE 82 report recommends that the ITU "should examine the feasibility of incorporating in its future regulations a stipulation that a satellite owner is responsible for removing its satellites from the GSO when they are no longer usable." UNISPACE 82, supra n. 27, at 70.

constraint on use of the geostationary orbit.[28] The limitations lie elsewhere.

1.1.2 The Radio Frequency Spectrum - Uses and Limitations

While physical saturation is not a significant constraint on use of the geostationary orbit, frequency saturation is. To perform a useful function, most satellites, and all telecommunication satellites, need to communicate with earth via the radio frequency spectrum.[29] Several factors constrain the use of the radio frequency spectrum by satellites.

As a result of physical characteristics of radio waves, only certain frequencies are suitable for wireless transmission of information by satellite. For example, in the lower end of the radio frequency spectrum, frequencies tend to follow the curvature of the earth. In the upper end of the spectrum, frequencies suffer significant propagation (i.e. reflection,

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28. See U.N. Doc. BP/7 _supra_ n. 5, at 12-14. A 1977 U.N. report estimated that based on the size of current satellites, the danger of collision was less than one collision per 500 years. The Geostationary Orbit, _supra_ n. 4, at 7. If large space structures are used in the future, as anticipated, collision danger will significantly increase. _Id_.

29. The radio frequency spectrum is that part of the electromagnetic spectrum which is between zero and 3,000 gigahertz (GHz). 1982 Radio Regulations, _supra_ n. 1, Art. 1, No. 6.

refraction and absorption) when they travel through the earth's atmosphere.[30] Due to these and other physical constraints, the groups of frequencies, or "bands", optimally suited for satellite telecommunications purposes lie between 1 to 10 GHz.[31]

In addition to physical constraints, there are also regulatory constraints on the frequencies satellites can use. As discussed earlier, the primary use of the geostationary orbit is by the telecommunications satellite services. The frequencies most suitable for those services are also well suited for other telecommunication services. The ITU has the responsibility for evaluating the needs of the various services and allocating frequencies.[32] Both the broadcasting satellite

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30. See Smith, Radio Frequency Allocation in Space Communication, in "World Wide Space Activities", Report Prepared for the Subcommittee on Space Science and Applications of the U.S. House of Representatives' Committee on Science and Technology, 95th Cong., 1st Sess., at 516, 519 (1977). Propagation may result in signal depolarization and attenuation of signal strength. Water vapour presents a particular problem. Attenuation due to precipitation and clouds "is generally negligible at frequencies below 10 GHz and increases with increasing frequency above 10 GHz." See U.N. Doc. BP/7, supra n. 5, at 14.

31. Sawitz, supra n. 8, at 43-2. Advancing technology has been extending the upper range of frequencies suitable for use by telecommunication satellites. These advances will be reviewed infra, at Section 1.2.

32. For a discussion of the ITU allocation function, see infra Section 3.1. Competition is so strong that different services often share the same frequency band. See infra n. 255.

service and the mobile satellite service have received ample frequency spectrum for their anticipated demand. The fixed satellite service, however, presents problems.

More than 95 percent of the geostationary satellites which are operational or planned, are in the fixed satellite service.[33] This service has been allocated several frequency bands by the ITU. Its principal allocations, according to normal pairings of uplink and downlink,[34] are: the 6/4 GHz ("C") band, which lies in the optimum range for use by telecommunication satellites;[35] the 14/11 and 14/12 GHz ("Ku") band, which is outside the optimum range, but generally satisfactory for use with today's technology; and the 30/20 GHz ("Ka") band, which is outside the optimum range and currently used only on an experimental basis.[36] These allocations are primarily on a shared-service basis with one or more

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33. Kimball, supra n. 21, at 3.

34. Uplinks and downlinks refer to the groups of frequencies on which information is transmitted either from the earth to satellite, or vice versa. Allocations to the fixed satellite service specify whether they are for uplink or downlink. 1982 Radio Regulations, supra n. 1, Art. 8.

35. A small portion of the 8/7 GHz band is also allocated, but is used mainly for government communications. FCC, Fourth Notice of Inquiry, Gen. Docket No. 80-741, App. B, at 5 (May 10, 1984) [hereinafter cited as Fourth Notice of Inquiry].

36. For precise allocations, see 1982 Radio Regulations, supra n. 1, Art. 8.

terrestrial services.[37] Great demands have been placed on the C and Ku band allocations to the fixed satellite service, and this service will be the focus of the Space WARC.[38]

Another factor which constrains use of the radio frequency spectrum is primarily a result of that use. Interference is the "degradation of performance of a communications system due to unwanted signals."[39] While a detailed examination of interference is beyond the scope of this paper, a general understanding of the subject is needed. Interference can come from various sources and can occur in the uplink or downlink. "Mutual interference", the interference from neighboring satellite systems operating on the same frequencies, is the

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37. Id.

38. Fourth Notice of Inquiry, supra n. 35, at 4; U.N. Doc. BP/7, supra n. 5, at 18; Kimball, supra n. 21, at 3; and see also Srirangan, Equity in Orbit: Planned Use of a Unique Resource, at 8, paper presented at the IIC 1984 Annual Conference, Berlin (Sept. 21-23, 1984).

39. U.N. Doc. BP/7, supra n. 5, at 15. Interference is defined by the ITU as "[t]he effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy. 1982 Radio Regulations, supra n. 1, Art. 1, No. 160.

40. Braun, 2 degree Spacing: Its Impact on Domestic Satellite Systems, Satellite Communications 32 (Nov., 1981). Other sources of interference for satellite systems are: (1) internal interference of the satellite itself from adjacent or cross-polarized transponders; and (2) terrestrial interference from microwave systems sharing the 4 and 6 GHz bands. Id.

most significant for a telecommunications satellite.[40]

Mutual interference has been cited as "the primary problem limiting the use of the geostationary arc . . . ."[41] It cannot be reduced to zero when a frequency band is shared in a geographical region.[42] While equipment can be designed to handle certain levels of interference,[43] there is always a level above which intelligent communication is no longer possible.[44]

Interference in a satellite telecommunications system depends on a combination of factors. These include: antenna characteristics of the earth station and satellite; modulation methods; power levels; propagation effects; and station-keeping and pointing accuracy of the satellite.[45] In general, the consequences of interference for geostationary telecommunications satellites are that: (1) satellites which are located in the same region of the geostationary arc must use different frequencies, or serve widely separated

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41. Sawitz, supra n. 8, at 43-3.

42. Id.

43. The CCIR develops standards for telecommunications equipment. See infra n. 127 and accompanying text.

44. To ensure new systems will not cause such interference to existing systems, a Coordination procedure has been developed within the ITU. See infra n. 272 and accompanying text.

45. Sawitz, supra n. 8.

geographical areas, in order to avoid mutual interference; and (2) satellites using the same frequencies and serving similar geographic areas must be spaced at a "minimum separation angle" so mutual interference is reduced to an acceptable level.[46] Both of these consequences depend primarily on two factors -- the orbital location and the frequency.[47] The relationship between these two factors establishes the concept of the "orbit/spectrum resource."

1.2 Satellite Technology - Past, Present and Future

An understanding of how satellites use the orbit/spectrum resource requires a basic knowledge of satellite technology. This section first presents a simplified description of a satellite telecommunication system, and a typical satellite.

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46. In general, as separation increases interference decreases. See U.N. Doc. BP/7, supra n. 5, at 17.

47. Minimum required orbital spacing also depends on (1) earth station and satellite antenna gain and sidelobe discrimination; (2) transmitted power; (3) receiving system sensitivity; and (4) sensitivity to interference. Fourth Notice of Inquiry, supra n. 35, at App. C, p. 5.

When planning a geostationary satellite telecommunication system, in addition to the frequency and orbital location, other matters must also be considered. They include the effect of solar interference, loss of solar power, fuel required for station keeping, and the need for an in-orbit spare. See the Geostationary Orbit, supra n. 4, at 6.

It then reviews significant advances in satellite technology and their consequences by using the *INTELSAT* series of satellites as examples. Thereafter, other technological advances which may affect use of the geostationary orbit are surveyed.

A satellite telecommunication system contains two major components -- the satellite and the earth station. A system will involve at least two earth stations and may involve more than one satellite. The earth station transmits a signal from its antenna to the satellite using the assigned uplink frequency. This signal is picked-up by the satellite receiving antenna. A transponder then amplifies it, changes its frequency to the assigned downlink frequency, and transmits the signal from the satellite transmitting antenna back to another earth station antenna. Terrestrial telecommunications networks carry the signal between the earth stations and the end users.

A "standard" C band satellite is assigned 500 MHz for uplink and another 500 MHz for downlink.[48] That total bandwidth is broken up into units for use by individual transponders which usually have a total bandwidth of 40 MHz each. With that bandwidth, each transponder can carry a certain amount of information, normally about 1,000 telephone channels or one

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48. A "standard satellite" is defined in U.N. Doc. BP/7, <u>supra</u> n. 5, at 18.

television channel. Satellite transmitting antennas are either global, hemispheric, or spot beams.[49]

The first commercial communications satellite, INTELSAT I (Early Bird), was launched in 1965. It used the C band, and had a capacity for either 240 circuits or one TV channel. Antennas were confined to the heavy traffic corridor between Europe and North America. Only two earth stations could access the satellite at a time.[50] By 1967, INTELSAT II had the same capacity, but it had hemispheric antennas and multipoint access for earth stations in its area of coverage.[51] The first INTELSAT III was launched only a year later, in 1968. It had a capacity five times greater than INTELSAT I or II, for a total of either 1,500 circuits or 4 TV channels, or combinations of both.[52]

The first INTELSAT IV was orbited in 1971. It could handle 4,000 circuits and 2 TV channels. It had two global receive antennas, two global transmit antennas, and for the first time, two steerable spot beam antennas which could focus beams to

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49. Id.

50. INTELSAT, Annual Report, 39 (1978) [hereinafter cited as 1978 INTELSAT Annual Report].

51. Id.

52. Id.

53. Id. at 23, and 40.

high density routes with greater power efficiency.[53] The first INTELSAT IV-A, launched in 1975, improved capacity to 6,000 circuits. This was accomplished by frequency reuse in the C band; the same frequencies were used by two antennas, one of which beamed east and the other west. Because there was wide geographical separation of service areas, interference was within acceptable limits.[54] Frequency reuse has become a major factor permitting increased use of the orbit/spectrum resource.[55]

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54. Id. at 25, and 40.

55. Frequency reuse in the north-south direction by satellites in the same geostationary arc should be an important technical issue at the Space WARC. Many developing countries are located much further south than the developed countries. If those countries can use the same frequencies, then access to the geostationary orbit/spectrum resource by the developing countries is not prevented due to use by developed countries. There appears to be some disagreement regarding the technical feasibility of such reuse. Two 1980 reports are somewhat contradictory. One report questioned whether north-south beam isolation would be sufficient to serve both hemispheres. Beakley, Satellite Communications, Growth and Future, Telecommunications, Vol. 14, No. 11, at 19, 23 (Nov., 1980). Another report, however, concluded that such frequency reuse was practical in the near term. Ackerman & Weinberger, Satellite Systems for Industrialized Nations - After WARC 79, in "A Collection of Technical Papers", AIAA 8th Communications Satellite Systems Conference, at 776 (1980). A 1981 U.N. Report concluded that "*if* North American and USSR domestic services use directional antennas, they can avoid interfering with South American or Asian services using stellites in the same arc." U.N. Doc. BP/7, *supra* n. 5, at 19 (emphasis added). It thus appears that for frequency reuse of this nature to work (1) the service areas should be widely separated (i.e. while the U.S. and Mexico may not qualify, Canada and Mexico should), and (2) the satellites must use spot beam antennas.

The first INTELSAT V was orbited in 1980, and incorporated a number of technological advances which allowed capacity to be dramatically increased to an average of 12,000 circuits and 2 TV channels. This was the first INTELSAT satellite to use the Ku band in addition to the C band. The C band was reused four times. Reuse was accomplished as before by east and west hemispheric beams, and that reuse was then doubled by use of "polarization".[56] The Ku band was reused twice by use of east and west spot beams.[57] INTELSAT VI is being designed to more than double the capacity of INTELSAT V through use of various advanced technologies.[58]

These increases in the capacity of INTELSAT satellites demonstrate the advances made in telecommunication science. They have been brought about primarily through frequency reuse and use of higher frequencies. Significant advances, however, have also been made in other areas of satellite technology.

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56. Electromagnetic waves can be polarized so that "two signals can be transmitted and received independently at the same frequency." U.N. Doc. BP/7, supra n. 5, at 7. See also Edelson, Marsten & Morgan, Greater Message Capacity for Satellites, IEEE Spectrum 56 (March, 1982).

57. INTELSAT, Annual Report, 12 (1983) [hereinafter cited as 1983 INTELSAT Annual Report]. Reuse by polarization is not as practical at frequencies higher than 10 GHz due to propagation effects of precipitation which can depolarize the signals. U.N. Doc. BP/7, supra n. 5, at 20.

58. 1983 INTELSAT Annual Report, supra n. 57, at 12.

Advances in antenna technology have been particularly noteworthy. The radiation pattern of earth station transmitting antenna is "one of the most important factors in determining the interference between systems of geostationary satellites."[59] Improvement in antenna characteristics recently prompted the U.S. Federal Communication Commissions (FCC) to reduce orbital spacing for C and Ku Band systems.[60] Improved antenna technology has also led to smaller and less expensive

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59. ITU, Recommendations and Reports of the CCIR, 1978, Vol. IV, Report 453-2, "*Fixed Service Using Communication Satellites*", para. 2.1, (1978) [hereinafter cited as *Fixed Service CCIR Report*].

A perfect antenna would radiate energy in a beam from the transmitting antenna directly to the receiving antenna and nowhere else. In practice this cannot be done. The energy radiated from an antenna is divided into three components. They are "the main beam, in which the power is sufficient for reliable communication, the side-lobe area, in which the power is insufficient for communication but may interfere with communication, and the rest of the circle, in which the power level is sufficiently low to avoid interference." U.N. Doc. BP/7, supra n. 5, at 8. At a given frequency, the minimum distance between satellites and between earth stations communicating with different satellites, is defined by the side-lobe power levels and the system sensitivity to interference. Id. See also Jeruchim, A Survey of Interference Problems and Applications to Geostationary Satellite Networks, Proceedings of the IEEE, Vol. 65, No. 3, at 317 (March, 1977).

60. Spacing in the C band has been reduced from 4 to 2.5 - 3.0 degrees for existing systems, and to 2 degrees for future systems. Fourth Nctice of Inquiry, supra n. 35. In other areas of the world, spacing for satellites in the C band is usually between three and five degrees. U.N. Doc. BP/7, supra n. 5, at 17. Advances in antenna design which result in decreased side-lobe radiation enable closer satellite spacing. Id. at 21.

earth station receiving antenna.[61] Nevertheless, an important general rule remains -- for smaller earth station antenna, either higher power satellites are required,[62] or higher frequencies must be used.[63]

Other technologies currently being studied may result in further improvements in orbit/spectrum use. They include: increased use of spot beams;[64] intersatellite links;[65]

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61. INTELSAT recently approved a new standard earth station with an antenna diameter of about 5 meters. Lowndes, Intelsat Alters Earth Station Standards, Aviation Week & Space Technology (AWST), Jan. 16, 1984, at 203. This earth station will, however, have less performance than large INTELSAT antenna and is designed primarily for use in isolated areas of developing countries. Id.

62. A 10 db increase in satellite EIRP (Equivalent Isotropically Radiated Power) can result in a significant reduction in antenna size and a great reduction in cost. ITU, Application of Space Telecommunications for Development, Service Prospects for the Rural Areas 7, U.N. Doc. A/CONF.101/BP/IGO/15 (1982) [hereinafter cited as U.N. Doc. No. BP/15]. Higher power may also be effectively achieved locally through use of spot beams. See infra n. 65.

63. Generally, as the frequency increases the required size of the antenna decreases. Lanpher, ACTS: The Case for U.S. Investment in 30/20 GHz, Satellite Communications, May 1983, at 22, 30.

64. Spot beams are an extension of the concept used in INTELSAT IV-A satellites where frequency reuse was obtained by using east and west beams. Multiple spot beams allow focusing of a satellite's radiated power, and frequency reuse by service to many geographically separated areas. Rothblatt, supra n. 6.

65. Satellite-to-satellite links can avoid multiple earth-to-satellite hops for very long distance communication, thereby increasing efficiency. UNISPACE 82, supra n. 27, at 18.

use of higher frequencies;[66] use of large space platforms or satellite clusters;[67]

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66. Satellites which operate in the 30/20 GHz bands are being tested in the U.S., Japan, and Europe; the U.S. system may use 20 spot beams for extensive frequency reuse. Id.; see also Lowndes, Acts Test Linked to Lead in Technology, AWST, April 9, 1984, at 76. One U.S. company has already filed an application with the FCC for an orbital assignment using the 30/20 GHz band. Lowndes, Hughes Plan May Start Round of Ka Band Filings, AWST, Dec. 19, 1983, at 28.

Higher frequencies have certain distinct advantages other than not being in an intensively used area of the spectrum. They permit use of smaller earth station antenna, closer satellite spacing, and because terrestrial services do not use the same frequencies, earth station antenna can be located in cities and even on customer premises. Unfortunately, higher frequencies have a strong drawback. They are subject to significant attenuation by rain, which requires diversity in earth station siteing, power boosting, or reduction of data rate. Wadsworth, Longitude-Reuse Plan Doubles Communication Satellite Capacity of Geostationary Arc, A Collection of Technical Papers, AIAA 8th Communications Satellite Systems Conference, at 198 (April, 1980).

67. Large space platforms would allow interconnection of missions and offer significant economies of scale while conserving the orbit/spectrum resource through reuse of several frequency bands. Satellite clusters connected by intersatellite links offer similar advantages, but would not be as cost efficient. Edelson, Marsten & Morgan, supra n. 56, at 64. See also NASA, The Next Step: Large Space Structures, NASA Facts, NF-129, (1982); Pelton, Is there a Space Platform in INTELSAT's Future ?, A Collection of Technical Papers, AIAA 8th Communications Satellite System Conference, at 408 (1980); Carey, Developing the Concept of a Geostationary Platform, A Collection of Technical Papers, AIAA 8th Communications Satellite System Conference, at 192 (1980); Das, A Report on the Technical Aspects of Regulatory-Policy Issues of Geostationary Platforms, NTIS No. PB 82 142191 (1981)(a study conducted for the U.S. FCC); and Comsat Clusters May Improve Coverage, AWST, Sep. 3, 1984, at 233.

digital signal transmission;[68] efficient signal processing schemes;[69] use of laser transmissions;[70] and improved station-keeping and antenna pointing.[71]

Operating techniques which may lead to more efficient use of the orbit/spectrum resource are also being developed. These include more efficient combinations of satellites in orbit;[72]

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68. Digital encoding has several advantages including a lower power requirement for a fixed signal quality, amenability to bandwidth compression, and facilitation of signal processing on-board the satellite. Edelson, Marsten & Morgan, supra n. 56, at 58-62; Special ISS Network Planning, Telesis, Vol. 6, No. 2 (April, 1979); and U.N. Doc. BP/7, supra n. 5, at 21.

69. Time-division multiple access (TDMA), for example, makes a more efficient allocation of satellite capacity to earth terminals based upon demand, than does frequency division multiple access (FDMA). Ackerman & Weinberger, supra n. 55; and U.N. Doc. BP/7, supra n. 5, at 21.

70. Laser transmissions could effectively eliminate interference and allow reduced satellite spacing. Laser signals, however, are very sensitive to weather conditions and would require earth stations much more complex and expensive than those required for radio signals. The Georgetown Space Law Group, The Geostationary Orbit: Legal, Technical and Political Issues Surrounding Its Use in World Telecommunications, 16 Case W. Res. J. Int'l L. 223, 232 (1984).

71. Weiss, Relating to the Efficiency of Utilization of the Geostationary Orbit/Spectrum in the Fixed-Satellite Service, Proceedings of the IEEE, Vol. 68, No. 12, at 1484, 1488 (1980).

72. Orbit/spectrum utilization is more efficient when satellites with similar characteristics are placed next to each other. Fixed Service CCIR Report, supra n. 59, at para. 8; Sawitz, supra n. 8, at 43-7; and U.N. Doc. BP/7, supra n. 5, at 22-23.

uplink/downlink reversal;[73] use of slightly inclined geosynchronous orbits;[74] and alternatives to the geostationary orbit such as eccentric 12 hour orbits.[75]

Improvements in other areas of technology also impact upon increased efficiency in use of the geostationary orbit. Advances in launch vehicle technology resulting in increased payloads have permitted use of heavier satellites capable of a variety of missions.[76] Additionally, developments in fibre-optic technology may establish cable as a more viable alternative to satellites, thereby relieving some of the pressure on the geostationary orbit.[77]

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73. With uplink/downlink reversal, in theory, a satellite could be inserted in orbit between two satellites using the frequencies currently assigned for uplinks and downlinks. The new satellite would reverse those frequencies and use the standard uplink for its downlink etc. New problems of interference, however, may result. U.N. Doc. BP/7, _supra_ n. 5, at 20. This technique is not used in the U.S. due to potential sharing problems with space and terrestrial systems; it may be useful in other areas of the world where use of the spectrum by terrestrial services is not as intense. Fourth Notice of Inquiry, _supra_ n. 35, at 26.

74. These plans would require use of more satellites and steerable earth station antenna, but could double or triple the capacity of the geostationary orbit. Ackerman, _supra_ n. 55, at 777; Wadsworth, _supra_ n. 66, at 198.

75. See The Geostationary Orbit, _supra_ n. 4, Add. 4, at 5-7.

76. Edelson, Marsten & Morgan, _supra_ n. 56, at 62-64.

77. Klass, _Prospect of Competition Jolting Intelsat Members_, AWST, June, 25, 1984, at 171, 177.

While technological advancement has been impressive, certain considerations need to be mentioned. First, a constraint on implementation of new technology is the existence of the very expensive facilities in use for current technology. Their technological obsolescence would entail a significant economic cost. Second, although satellite technology for use above 15 GHz is changing rapidly and affects the state of the art, technology for use below 15 GHz is changing at a more moderate pace and mainly affects factors of cost or performance.[78] Finally, no discussion of satellite technology would be complete without stressing the complex interface between different components of satellite systems. For example, greater radiated power from a satellite may enable the use of smaller earth station antennas, but use of smaller antennas generally requires a wider satellite spacing, and increased satellite power can adversely affect terrestrial systems.[79]

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78. See Fourth Notice of Inquiry, supra n. 35, at 4.

79. UNISPACE 82, supra n. 27, at 18.

For additional information on communications satellite technology, see also ITU, Provisional Technical Report For WARC - 84, Doc. 4/286-E (June 9, 1981); Sachdev, Satellite Communication Technology Challenges For The 80's, AIAA 8th Communication Satellite System Conference 433 (1980); Rusch & Cuccia, A Projection of the Development of High Capacity Communications Satellites in the 1990's, AIAA 8th Communication Satellite System Conference 412 (1980); FCC, Second Notice of Inquiry, Gen. Docket No. 80-741, Appendix C (June 1, 1981).

1.3 The Orbit/Spectrum Resource -- Its Limits

The geostationary orbit/spectrum resource is limited for several reasons. First, it is an area of limited volume.[80] Second, the frequencies available for use by geostationary telecommunication satellites are limited by physical and regulatory constraints.[81] Finally, due to mutual interference, satellites must often be spaced at a minimum separation angle.[82] Given these limitations, the next issue is its capacity in numbers of satellites.

A 1977 U.N. study examined the potential limits of the orbit/spectrum resource and determined "[i]t is impossible to state how many satellites can be accommodated in the geostationary orbit."[83] This result is due to the nature of this resource. Unlike most other "resources", such as coal, or other minerals, the orbit/spectrum resource is not consumed by use. It is a renewable, non-depletable resource. Its capacity is mainly limited by technology, which has been continually

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80. See _supra_ n. 5 and accompanying text.

81. See _supra_ n. 30-38 and accompanying text.

82. See _supra_ n. 41-46 and accompanying text.

83. The Geostationary Orbit, _supra_ n. 4, at 1.

advancing, and depends on so many factors that it is impossible to quantify it at any certain time.[84] Nevertheless, the dimensions of the orbit/spectrum resource are finite. Although its ultimate maximum capacity is impossible to quantify due to technological advances, certain aspects of this resource are approaching their limits.

Concern has repeatedly been expressed that some of the more desirable dimensions of the resource are reaching saturation. A report prepared for the U.S. Congress in 1977 concluded that "[t]he 4-6 GHz band is the most highly used part of the spectrum and is, for all intents and purposes, already completely filled."[85] A 1981 U.N. report on use of the geostationary orbit declared that portions of the orbit were "virtually full" with respect to the 6/4 GHz band.[86] Recently, the U.S. FCC stated "we can no longer warrant that we will be

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84. Although capacity of the orbit/spectrum resource cannot be calculated, it is possible to examine a proposed satellite system, with all of its parameters defined, and determine whether it will significantly interfere with existing and planned systems. Id. This is accomplished through procedures established by the ITU. See infra n. 268-275 and accompanying text.

85. Smith, supra n. 30, at 519.

86. U.N., Doc. BP/7, supra n. 5, at 18.

For a more detailed analysis of the concerns expressed about the 4/6 GHz band and other bands, see Jakhu, The Legal Regime of the Geostationary Orbit, 38 - 75, (1983) (Doctoral Thesis on file at the McGill University, Institute of Air & Space Law).

able to grant every orbital assignment that may be requested by qualified applicants."[87]

In contrast to studies which detail the saturation of the 6/4 GHz band, there are other studies which conclude that the overall capacity of the orbit/spectrum resource is sufficient at least for the remainder of this century.[88] These studies, however, base their estimates on use of advanced technologies and higher frequencies. Understandably, a study based on implementation of advanced technologies and the most efficient use of the orbit/spectrum resource will vary greatly from a

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87. FCC, Licensing of Space Stations in the Domestic Fixed-Satellite Service, Docket No. 81-704, at 36, para. 76 (April 27, 1983). A recent ITU Report stated "there are certain orbital segments and frequency bands that are already congested, and this may lead to coordination processes which may be complex and costly." ITU, CCIR Preparatory Meeting ORB - 85, Joint Meeting, Doc. B/152 (Rev. 1)-E, at 3 (July 17, 1984).

88. One study concluded orbit/spectrum capacity would be "adequate to meet the foreseeable needs of the Fixed Satellite Service for the remainder of this century." Weinberger, Communication Satellite Spectrum Conservation Through Advanced Technology, at 30, paper presented at EMC 80, International Wroclaw Symposium on Electromagnetic Compatibility (1980).

89. Typical of this relationship is a U.N. study which concludes "foreseeable technology will permit the geostationary orbit to accommodate the growth of existing systems and the introduction of new systems for new users for at least the next two decades." U.N. Doc. BP/7, supra n. 5, at 23-24. However, this study also acknowledged that (1) future systems may have to use advanced technology to gain access to the orbit; (2) use of advanced technologies may become mandatory; and (3) these technologies are probably going to be more expensive, and therefore the burdens imposed will "fall most heavily on the developing countries . . ." Id. at 24.

study based on use of current technology and use of the C band.[89] Regardless of the technology employed, however, studies generally agree that, at least for the C and Ku bands, sometime in the late 1980s to the mid-1990s, significant areas of the orbit/spectrum resource will be saturated.[90] As a direct result of concerns for availability of the C and Ku bands, some developed countries have proceeded with plans for geostationary telecommunication satellites primarily to ensure they secure a favorable orbital slot while they are still available.[91]

Saturation of the C band is of particular concern to developing countries. It is the technologically most well-developed band because it has been in use the longest. Its physical characteristics are also desirable to developing countries; those countries often have high rainfall areas which result in adverse propagation effects when higher frequencies

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90. A NASA chartered study concluded that by the early 1990s U.S. capacity in the C and Ku band would be saturated. Studies Forecast Satcom Shortage, AWST, Feb. 25, 1980, at 42; see also Lowndes, U.S. Facing Competition for Satellite Positions, AWST, March 8, 1982, at 103. Another author concluded that even with technological improvements, the capacity of the lower bands is finite and will be overtaken by growth in the late 1980s or mid 1990s. Lanpher, *supra* n. 63.

91. Australia was motivated by such concerns, see *infra* n. 250 and accompanying text; as was Canada, see Jakhu, *supra* n. 86, at 58.

are used.[92] Moreover, the C band is the most economical band to use because the associated equipment, which is based on established technology, is generally less expensive than equipment based on newer technology.

Given the concerns expressed for the continued availability of the more advantageous portions of the geostationary orbit/spectrum resource, it is not surprising to see efforts being made by developing nations to ensure their access in the future. These nations are concerned not only about availability, but also price. The use of new technologies and higher frequencies involves additional costs. "The concept of "saturation point" embodies the idea that at some point the incremental cost of obtaining more channels will rise dramatically."[93] Moreover, the satellite systems most desirable to developing nations may not use the orbit/spectrum resource as efficiently as it could be used.[94] Thus, estimates based on use of the most efficient technologies and higher frequencies may not be warranted from the point of view of developing countries.

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92. See supra n. 30; and U.N. Doc. BP/15, supra n. 62, at 12.

93. Lanpher, supra n. 63.

94. Small, simple earth stations are necessary for use of satellites by rural, sparsely settled areas. See infra n. 238. Such stations, however, require high power satellites which do not use the orbit/spectrum resource in the most efficient manner. See UNISPACE 82, supra n. 27, at 18.

Chapter 2

THE INSTITUTIONAL FRAMEWORK

This chapter reviews the major institutions involved with orbit/spectrum resource issues. Two institutions are examined in particular detail: the ITU, the forum for the Space WARC; and *INTELSAT*, the largest single user of the geostationary orbit. Other institutions are covered in a more general manner, stressing aspects of particular relevance.

2.1 The International Telecommunication Union

The ITU is the sole specialized agency of the U.N. for international telecommunications.[95] It has the largest

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95. 1982 ITU Convention, supra n. 2, Annex 3. The ITU is a direct descendant of the International Telegraph Union, which was formed in 1865. For a history of the ITU see Leive, International Telecommunications and International Law: The Regulation of the Radio Spectrum, (1970); and Glazer, The Law-Making Treaties of the International Telecommunication Union Through Time and in Space, 60 Mich. L.R. 269 (Jan. 1962).

membership of any international organization.[96] The general purposes of the ITU are:

> a) to maintain and extend international cooperation . . . for the improvement and rational use of telecommunications of all kinds, as well as to promote and to offer technical assistance to developing countries in the field of telecommunications;
>
> b) to promote the development of technical facilities and their most efficient operation with a view to improving the efficiency of telecommunications services, increasing their usefulness and making them, so far as possible, generally available to the public;
>
> c) to harmonize the actions of nations in the attainment of those ends.[97]

To accomplish these purposes, duties were assigned to the ITU. Three duties are of particular relevance. These duties are to:

> a) effect allocation of the radio frequency spectrum and registration of radio frequency assignments in order to avoid harmful interference between radio stations of different countries;
>
> b) coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of the radio frequency spectrum;

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96. The ITU has 158 member countries. Membership is limited to sovereign states. *1982 ITU Convention*, supra n. 2, Art. 1. While the ITU fully recognizes the sovereign rights of each nation to regulate its telecommunications, the vast majority of nations have joined the ITU out of a realization that international cooperation in use of the radio frequency spectrum is a necessity due to the potential of harmful interference from stations operating in other nations.

97. Id. Art. 4(1).

c) foster international cooperation in the delivery of technical assistance to the developing countries and the creation, development and improvement of telecommunication equipment and networks in developing countries by every means at its disposal, including through its participation in the relevant programs of the United Nations and the use of its own resources, as appropriate;[98]

Two international agreements define the organization and operations of the ITU: the Convention,[99] and the Regulations.[100] The Convention is the basic instrument, or constitution of the ITU. It creates the legal existence of the ITU, fixes its structure, defines its purposes and membership, establishes its relationship with the U.N. and other international organizations, and sets forth certain general provisions relating to telecommunications.

The Radio Regulations are extremely detailed provisions of over 1,700 pages, which are created or revised at Administrative Conferences. The provisions of most importance to the Space WARC are Chapters III and IV. Chapter III covers the allocation of the frequency spectrum to various services and general rules for assignment and use of frequencies. The

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98. Id. Art. 4(2).

99. Id.

100. 1982 Radio Regulations, supra n. 1. In addition to the Radio Regulations, there are also Telephone and Telegraph Regulations. Only the Radio Regulations, however, are directly related to issues which will be addressed at the Space WARC.

very important Table of Frequency Allocations is found there. Chapter IV sets forth the rules for Coordination, Notification, and Registration of frequencies.[101] These two chapters have been called "the heart of the Regulations",[102] and have been controversial since the 1947 Atlantic City Conferences. The Regulations, like the Convention, is a treaty which binds the governments that have approved them.[103]

The ITU is organized into four permanent bodies: the Secretariat; the International Frequency Registration Board (IFRB); the International Radio Consultative Committee (CCIR); and the International Telegraph and Telephone Consultative *Committee (CCITT).* Three other bodies are convened periodically: the Plenipotentiary Conference; the Administrative Council; and Administrative Conferences.

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101. Part A of the Regulations also includes terminology and definitions, rules regarding measures against interference, administrative provisions for stations, and technical characteristics of stations. Part B contains provisions relating to groups of services and to specific services and stations. The Radio Regulations also contain 44 appendices which supplement certain areas of Part A and B. Allotment plans which have been approved are also included in the appendix. 1982 Radio Regulations, supra n. 1.

102. Codding and Rutkowski, The International Telecommunications Union In A Changing World 215, (1982).

103. Mili, International Jurisdiction in Telecommunication Affairs, 40 Telecommunications Journal 122, 181 & 287 (1973).

The Plenipotentiary Conference is the "supreme organ" of the ITU.[104] It is composed of the delegations of ITU member countries.[105] The Conferences are supposed to be convened every five to six years.[106] The Conference is the "political organ" of the ITU.[107] It determines the general policies of the ITU, setting guidelines for the other ITU bodies to follow between Conferences, and is the only ITU body enpowered to revise the ITU Convention.[108] All decisions of the Conference are by majority vote.[109]

Administrative Conferences are held at the world level, or in

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104. 1982 ITU Convention, supra n. 2, Art. 5(1).

105. Id. Art. 6.1.

106. Id. This schedule is not always met. The 1982 Nairobi Conference, was held nine years after the preceeding Malaga-Toremolinos Conference. At Nairobi, however, Article 6 was amended to specifically state that the interval between Conferences will not exceed six years. The next Plenipotentiary Conference is scheduled for 1989.

107. Mili, supra n. 103, at 176.

108. 1982 ITU Convention, supra n. 2, Art. 6.2. Other important functions of the Conference include the conclusion or revision of agreements between the ITU and other international organizations; establishment of the ITU budget and fiscal limits; election of the Secretary General, his Deputy, and members of the IFRB; and the handling of other telecommunications questions as necessary. Id.

109. Id. Art. 77.14.

one of the three ITU Regions.[110] These Conferences make the detailed Regulations which govern the use of the geostationary orbit and the radio spectrum. They are therefore of great practical importance. Conferences also may adopt Recommendations and Resolutions regarding the establishment of procedures, study of certain matters, or convening of other Conferences. Recommendations and Resolutions, in contrast to Regulations, are not legally binding.[111] A Regional Administrative Radio Conference (RARC) may discuss only telecommunications issues of a regional nature, and its decisions must conform with the Regulations.[112] The agenda of a World Administrative Radio Conference (WARC) may include the complete or partial revision of the Regulations.[113]

One of the important functions of a WARC is the allocation of portions of the radio spectrum to the different telecommunication services. Frequencies may be allocated to a service on an exclusive or shared basis. If the allocation is

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110. Id. Art. 7.1. The three ITU Regions are: (1) Europe, Africa and the USSR; (2) Australia, Asia and the south Pacific; and (3) the Americas. 1982 Radio Regulations, supra n. 1, Art. 8, Nos. 393-95.

111. See Mili, supra n. 103, at 348; and Christol, The International Telecommunication Union and the International Law of Outer Space, XXII Colloquium 35,42 (1977).

112. 1982 ITU Convention, supra n. 2, Art. 7.3 (2).

113. Id. Art. 7.

on a shared basis, two services may have equal rights, or there may be a primary and secondary service. The allocation of frequencies is so important that it has been referred to as the "legislative process" of the ITU.[114]

Since World War II, there have been three WARCs with broad jurisdiction over the Regulations. These WARCs were held in 1947 at Atlantic City, and in 1959 and 1979 at Geneva. Such general WARCs are rare, and the next one is not expected until 1999. Specialized conferences with limited jurisdiction over parts of the Regulations are much more frequent. Specialized Conferences which have affected space telecommunications are: the Extraordinary Administrative Radio Conference of 1963; the 1971 WARC for Space Telecommunications; the 1974 WARC for Maritime Mobile Telecommunications; the 1977 WARC for Broadcast Satellite Service; and the 1983 RARC for Broadcast Satellite Service.[115] The next such specialized Conference will be the Space WARC.[116]

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114. Leive, supra n. 95, at 19.

115. For a discussion of these Conferences, see infra Chapter 4.

116. An Administrative Conference may be called for by: (1) a Plenipotentiary Conference; (2) a recommendation of a previous WARC if approved by the Administrative Council; (3) the request of one-quarter of the members of the Union; or (4) a proposal by the Administrative Council. 1982 ITU Convention, supra n. 2, Art. 54.2(1). The Space WARC was called for by the 1979 WARC and approved by the Administrative Council.

Conference decisions are made by majority vote of the ITU delegates attending, with each nation having one vote.[117] In addition to ITU members, certain observers may attend the conferences in an advisory capacity. These include observers from the U.N., certain regional and international organizations, and recognized private operating agencies.[118]

Once decisions have been made, delegations are to conform to them as far as possible.[119] However, a Reservation may be made to a decision if such decision would prevent a government from approving the Regulations.[120] The ability to make Reservations enable all governments to sign the Final Acts of a Conference even if they disagree with certain provisions and may not follow them.[121]

The other periodically convened body of the ITU is the Administrative Council. The Council is composed of 41 members elected by the Plenipotentiary Conference "with due regard for equitable distribution of the seats . . . among all regions of

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117. Id. Art. 77.14.

118. Id. Art. 61.3.

119. Id. Art. 77.16(1).

120. Id. Art. 77.16(2). In a Plenipotentiary Conference, Reservations may also be made to a change in the Convention. Id.

121. For a further discussion of the Reservation process, see Codding and Rutkowski, supra n. 102, at 211-213 & 217-218.

the world".[122] It generally meets once a year for about three weeks. It acts on behalf of the Plenipotentiary Conference during the interval between Conferences.[123]

The Secretariat is a permanent and continuing body of the ITU. It is headed by a Secretary-General who ensures the administrative and financial regulations adopted by the Administrative Council are carried out.[124] The Secretariat is responsible for a variety of functions which are crucial to the smooth functioning of the ITU.[125]

The other three permanent bodies of the ITU are the IFRB, the CCIR, and the CCITT. These bodies perform very important technical functions. *The CCIs* are the "real technical organs

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122. 1982 ITU Convention, supra n. 2, Art. 8.1(1).

123. Id. Art. 8.3. The Council has three main duties. First, it facilitates implementation of the Convention, Regulations, and decisions of various ITU conferences, and performs any duties assigned by the Plenipotentiary Conference. Second, it ensures efficient coordination of ITU work, and exercises financial control over permanent ITU organs. Finally, it determines the technical assistance policy, and promotes international cooperation for provision of technical assistance to the developing countries. Id. Art. 8. See also Codding & Rutkowski, supra n. 102, at 139-158.

124. 1982 ITU Convention, supra n. 2, Art. 9.1(3).

125. The Secretariat provides support services for Plenipotentiary and Administrative Conferences, and for meetings of the Administrative Council and Consultative Committees. It coordinates the flow of information dealing with the work of the ITU and the international telecommunications community in general. Additionally, it is the daily contact point between the ITU and its members.

of the ITU", and constitute its "nucleus".[126] The CCITT, being concerned with telephone and telegraph matters, is not significantly involved in Space WARC issues. The CCIR, however, is very involved.

The duties of the CCIR are to "study technical and operating questions relating specifically to radio communication and to issue recommendations on them".[127] In conducting its studies the CCIR must pay "due attention" to issues regarding the "establishment, development and improvement of telecommunication in developing countries. . . ."[128] Studies conducted by the CCIR serve as the basis for the technical decisions of the Administrative Conferences, and often aid the work of the IFRB. The CCIR consists of a Plenary Assembly with a Director and a specialized staff,[129] and study groups set up by the Assembly.[130] The Study Groups are assigned technical questions by the Assembly. The Study Groups generally form working parties to make in-depth examinations of different aspects of the questions assigned. The Study Groups prepare

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126. Mili, supra n. 103, at 562.

127. 1982 ITU Convention, supra n. 2, Art. 11.1(1); see also ITU, Role of the CCIR in Space Telecommunications Technology, U.N. Doc. 101/BP/IGO/14 (August 13, 1982).

128. 1982 ITU Convention, supra n. 2, Art. 11.1 (3).

129. Id. Art. 11.3(c).

130. Id. Arts. 11.3(b) & 72.

reports and recommendations for the Assembly. Recommendations approved by the Plenary Assembly, while not legally binding on ITU members, are "universally recognized and respected".[131] Moreover, CCIR recommendations are important to the ITU law-making process; they form the basis for the regulations ultimately adopted by the Administrative Conferences.

Of particular importance to the Space WARC is study group 4 on "Fixed Service Using Communication Satellites", and its Interim Working Party (IWP) 4/1 on "Technical Considerations Affecting the Efficient Use of the Geostationary Orbit". IWP 4/1 has primary responsibility for the CCIR's preparation for the Space WARC.[132] It has prepared a provisional report for the WARC which covers technical aspects and a range of possible plans to ensure equitable access to the geostationary orbit/spectrum resource.[133]

Participation in CCIR activities is open to a wide spectrum of interested groups. These include all ITU member countries,

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131. Mili, supra n. 103, at 565.

132. The 1979 WARC invited the CCIR to conduct preparatory studies and provide the first session of the Space WARC with technical information "concerning principles, criteria and technical parameters including those required for planning space services . . ." 1982 Radio Regulations, supra n. 1, Res. No. 3 (BP).

133. ITU, Provisional Technical Report for WARC-84, CCIR Doc. no 4/286-E, (June 12, 1981) [hereinafter cited as CCIR Space WARC Report].

private operating agencies recognized and approved by an ITU member, international and regional telecommunication organizations, and scientific or industrial organizations engaged in the study of telecommunications problems or the manufacture of telecommunications equipment.[134] All organizations other than members serve in an advisory capacity only, except that a private operating agency may act on behalf of a member if the member so informs the CCIR.[135]

The IFRB is the last of the permanent bodies of the ITU. It is primarily involved with application of the Regulations during the registration process through which nations receive

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134. 1982 ITU Convention, supra n. 2, Art. 68.

135. Id. Art. 68.

Although the CCIR studies and recommendations are of great importance, its composition and working methods have been criticized. In the Plenary Assemblies, and especially the working groups, there is a lack of participation by developing nations. For example, in the Nov. 1980 meeting of IWP 4/1 the only developing nations sending representatives were Brazil, China, Columbia, India, Indonesia, and Papua New Guinea. CCIR Space WARC Report, supra n. 133, Appendix II. The failure to secure significant participation by developing countries is laid to two factors. First, due to the large number of meetings and their highly technical nature, developing countries often lack a sufficient number of experts to participate. Second, where such technical expertise exists, the financial resources to send representatives may not. While solutions to this problem have been proposed, the situation remains unchanged. This has led to suspicion by developing countries of CCIR work products. In the future, this situation could cause obstacles to the effective functioning of the ITU. For a discussion of this problem and proposed solutions, see Codding & Rutkowski, supra n. 102, at 102-105; and Jakhu, supra n. 86, at 248-250.

rights to interference-free use of radio frequencies and geostationary orbit locations.[136] The main responsibility of the Board is the orderly recording in the Master Frequency Register of frequency assignments, and positions assigned satellites in the geostationary orbit.[137] Its duties also include: (1) furnishing advice to ITU members "with a view to the equitable, effective and economical use of the geostationary satellite orbit, taking into account the needs of Members requiring assistance, the specific needs of developing countries, as well as the special geographical situation of particular countries;"[138] (2) performing other duties related to use of the geostationary orbit/spectrum resource which are assigned by an ITU Conference, or by the Administrative

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136. This process is discussed, infra Section 3.1.

137. 1982 ITU Convention, supra n. 2, Art. 10.4 (a) & (b). In accomplishing the task of recording frequencies and geostationary orbital positions, the IFRB must make findings. These findings determine, to a large extent, the legal status of the information recorded, and require interpretation of the ITU Convention and the Radio Regulations. In this respect the IFRB functions in a quasi-judicial manner. In performing this function the Board is guided by its Rules of Procedure, and Technical Standards. The Standards are based on relevant Radio Regulations, decisions of Administrative Conferences, Recommendations of the CCIR, and the state of the radio art. 1982 Radio Regulations, supra n. 1, Art. 13, No. 1582.

138. 1982 ITU Convention, supra n. 2, Art. 10.3(c).

Council;[139] and (3) providing technical assistance in preparation for radio conferences to other ITU organs and developing countries.[140]

The IFRB has increasingly undertaken activities of a developmental assistance nature. It provides advice to nations on their frequency management problems, including advice on which frequencies and equipment would best meet their needs. Additionally, due to the increasing complexity of the Radio Regulations, the IFRB is holding periodic seminars to assist developing countries in their understanding of the ITU and the Regulations. Funds from the U. N. Development Program (UNDP) have been made available to increase the participation by the developing countries.[141]

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139. Id. Art. 10.3 (d). An example of such other duties is the invitation to the IFRB by the 1979 WARC to participate in the ground work for the Space WARC by carrying out technical preparations, and by preparing a report on the operation of relevant provisions of the Radio Regulations and difficulties members may have incurred in gaining access to the geostationary orbit/spectrum resource. 1982 Radio Regulations, supra n. 1, Resolution No. 3. That report was to have been completed and circulated to administrations by Aug. 1984. See ITU, Administrative Council Resolution No. 895, "World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It", at invites 1 (1983) (copy attached at appendix A) [hereinafter cited as Space WARC Agenda]. As of October 30, 1984, the report had not been circulated. Telephone interview with Harold G. Kimball, Executive Director for Space WARC, U.S. Department of State (Oct. 30, 1984).

140. 1982 ITU Convention, supra n. 2, Art. 10.3 (e).

141. Codding & Rutkowski, supra n. 102, at 125-126.

The IFRB is composed of five individuals who are elected by the Plenipotentiary Conference in such a manner as to ensure "equitable distribution amongst the regions of the world".[142] This provides for a distribution of power between the developed and developing countries. Board members must be thoroughly qualified in the radio field, and have experience in the assignment and use of frequencies.[143] Members of the IFRB serve not as representatives of their countries or regions, but as "custodians of an international public trust".[144] Due to its independent character, equitable representation and specific duties of assisting developing countries, the Board is perceived by many developing countries as a protector of their interests.[145]

In summary, the ITU is a complex organization with various independent organs. At the Space WARC, the future credibility of the ITU will be involved. As an organization, it has a great interest in a successful Conference. Should important space powers take significant Reservations to the Final Acts,

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142. 1982 ITU Convention, supra n. 2, Art. 10.1.

143. Id. Art. 57.1(1).

144. Id. Art. 10.2. ITU member countries and other Board members must respect the independent nature of the IFRB and not attempt to instruct or influence Board members. Id. Art. 57.4.

145. Codding & Rutkowski, supra n. 102, at 122.

the Conference would be considered a failure. Thus, one can expect ITU officials, especially members of the IFRB, will exert their influence to obtain a result satisfactory to the vast majority of members and to the space powers.

2.2 Other United Nations Bodies

In addition to the ITU, several other U.N. organs are involved with issues relating to use of the geostationary orbit/spectrum resource. The General Assembly has elaborated principles on the use of outer space in numerous Resolutions.[146] In 1961, the General Assembly unanimously passed Resolution No. 1721 which included a provision expressing the belief that "communication by means of satellites should be available to the nations of the world as soon as practicable on a global and non-discriminatory basis . . ."[147] Other resolutions of similar import have

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146. The precise legal effect of U.N.G.A. Resolutions is unsettled N.M. Matte, Aerospace Law, Telecommunications Satellites 30 (1982). Nevertheless, Resolutions have significant political importance at the very least.

147. U.N.G.A. Res. No. 1721 (XVI) of Dec. 20, 1961, "International Co-operation in the Peaceful Uses of Outer Space."

been passed.[148]

The U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) is the only intergovernmental body concerned exclusively with all aspects of the peaceful uses of outer space. Its Legal Sub-Committee has been responsible for the drafting of most of the international agreements relating to outer space.[149] One issue on the COPUOS agenda is the definition and/or delimitation of outer space including questions relating to the geostationary orbit. COPUOS in recent years, however, has been ineffective in resolving issues on its agenda, and serious doubts have been expressed about its ability to cope with the legal questions arising from future outer space activities.[150] One would not, therefore, expect any agreement in COPUOS in the near future which could affect the Space WARC.

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148. Resolution. No. 2601 reaffirmed the principle of universal accessibility to communications satellites, and called upon states negotiating international agreements in this field to bear that principle in mind. U.N.G.A. Res. No. 2601 (1960). Resolution No. 1963 recognized the potential contribution of communications satellites to the expansion of global telecommunications facilities and the possibilities they offer for increasing information flow and furthering U.N. objectives. U.N.G.A. Res. No. 1963 (1963).

149. For detailed examination of the part played by COPUOS in the drafting of agreements, see Christol, The Modern International Law of Outer Space (1982).

150. Matte, Institutional Arrangements for Space Activities: An Appraisal, XXIV Colloquium 211, (1981).

The U.N. Educational, Scientific and Cultural Organization (UNESCO) is also involved with issues related to the geostationary orbit/spectrum resource. It is one of the chief forums where developing countries have been making efforts toward the establishment of a "New International Communications and Information Order."[151] It has also conducted studies in developing countries relating to the use of satellite communications to assist in educational and cultural development.[152]

The U.N. Development Program (UNDP) provides financial assistance to developing countries for certain telecommunication projects, and for feasibility, fellowship and training allowances. Assistance for projects is only available to a requesting country that is capable and willing to contribute to the total cost; UNDP funds are unavailable to countries too poor to spend any of their money. Moreover, requests for financial assistance far exceed the available funds.[153]

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151. See generally, UNESCO, Many Voices One World, Report by the International Commission for the Study of Communication Problems, (1980).

152. See Matte, supra n. 10, at 42-3.

153. Matte, supra n. 146, at 39-40.

2.3 International Common User Organizations

Nations which use satellites for telecommunications do so primarily through participation in "common user organizations."[154] While some of those nations have domestic systems of their own, they use common user organizations for most of their international telecommunication needs. Although common user organizations will remain "the major providers of satellite services now and in the future . . ."[155] they are not eligible for ITU membership and have "no direct administrative or legal representation within the ITU."[156] Common user organizations may attend Administrative Conferences and CCIR meetings as observers, and their interests in the Coordination

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154. A common user organization is "an organization of two or more ITU Administrations that jointly own and operate a satellite system for their international and/or domestic requirements." Dizard, Space WARC and the Role of International Satellite Networks, 15 (1984). Most common user organizations are designed to weigh the interests of their members at least proportionately, if not equally. Levy, Institutional Perspectives on the Allocation of Space Orbital Resources: The ITU, Common User Satellite Systems and Beyond, 16 Case W. Res. J. Int'l L. 171, 178 (1984).

155. Levy, supra n. 154, at 176.

156. Dizard, supra n. 154, at 9. ITU membership is limited to nations. See supra n. 96. The paradox of INTELSAT, the largest single user of the geostationary orbit/spectrum resource, not being eligible for ITU membership has been commented on. Jakhu recommends creation of an "associate membership" category in the ITU for international organizations such as INTELSAT. Jakhu, supra n. 86, at 224.

157. These processes are addressed infra Section 3.1.

and Notification processes[157] are handled by individual nations known as "Notifying Administrations."[158] At the Space WARC, common user organizations will be active observers and can be expected to use their influence with their member nations to further their interests at the WARC. The largest common user organization is INTELSAT.

2.3.1 INTELSAT

INTELSAT, the International Telecommunications Satellite Organization, was established in 1964, by the U.S. and ten other nations.[159] The tremendous success of INTELSAT has done much to promote the use of satellites for telecommunications throughout the world.[160] INTELSAT currently consists of 109

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158. Dizard, _supra_ n. 154, at 9. For example, all INTELSAT satellites are registered with the IFRB by the U.S., on behalf of INTELSAT.

159. Leive, _Essential Features of INTELSAT: Applications for the Future_, 9 J. Space L. 45, 46 (1981).

160. For a history of the development of INTELSAT see Snow, _International Commercial Satellite Communications, Economic and Political Issues of the First Decade of INTELSAT_, (1976); and Matte, _supra_ n. 146, at 108-141.

member countries, and over 170 nations use INTELSAT satellites.[161] INTELSAT provides about two-thirds of the world's public international telecommunication services, as well as domestic telecommunication services for many countries.[162] With sixteen satellites in the geostationary orbit and plans for more, it is the largest single user of the geostationary orbit/spectrum resource.[163]

INTELSAT created a new form of international organization. This form is fixed by two international agreements. The INTELSAT Agreement is signed by sovereign states,[164] and the

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161. 1983 INTELSAT Annual Report, supra n. 57, at 3.

162. In 1984 INTELSAT was providing domestic service for 25 nations. Pelton, Communications: Developing Nations Faster, Satellite Communications 19 (July, 1984).

163. 1983 INTELSAT Annual Report, supra n. 57, at 9. Six INTELSAT V-A series satellites are scheduled for launch in 1984-85, and five new INTELSAT VI satellite launches are planned, with the first two in 1986. INTELSAT, Intellink, Vol. 1, No. 18, at 1 (1983). At present, INTELSAT has "21 locations in the [geostationary orbit] which are in various stages of IFRB registration, for one or more series of INTELSAT satellites." INTELSAT, WARC-ORB-85/88, at 1 (1984) (unpublished document available from INTELSAT). As part of their plans, INTELSAT is establishing a new business service (IBS) which will carry video, audio, voice and data information, and allow use of small earth stations located on or near customer premises. Godwin, The Proposed ORION and ISI Transatlantic Satellite Systems: a Challenge to the Status Quo, Jurimetrics, Vol. 24, No. 4, at 297, 302 (1984).

164. "Agreement Relating to the International Satellite Organization", Aug. 21, 1971, 23 U.S.T. 3813, T.I.A.S. 7532 [hereinafter cited as INTELSAT Agreement]. This Agreement sets forth the basic provisions, principles and structure of the organization.

Operating Agreement is signed by governments or their designated public or private telecommunications entities.[165] These agreements establish INTELSAT as both an international governmental organization, and an international corporation

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165. INTELSAT Operating Agreement, T.I.A.S. 7532 (1971). The Operating Agreement sets forth more detailed financial and technical provisions. In most countries, the state exercises monopoly control over telecommunications through a government department or ministry of "Post, Telegraph and Telephone" (PTT). The Operating Agreement is generally signed for such countries by their PTT. In the U.S., government monopoly over telecommunications does not exist; the Communications Satellite Corporation (COMSAT) signed the Operating Agreement for the U.S.

166. INTELSAT is organized into four bodies. The Assembly of Parties consists of the states party to the INTELSAT Agreement. In the Assembly each state has one equal vote. The Assembly meets every two years and primarily considers aspects of interest to members as sovereign states. INTELSAT Agreement, supra n. 164, Art. VII.

The Meeting of Signatories consists of the Signatories to the Operating Agreement. This body meets yearly and considers commercial matters which are of interest to the Signatories as investors. As in the Assembly of Parties, each Signatory has one equal vote. Id. Art. VIII.

The Board of Governors is the principal managing body of INTELSAT. It meets at least four times a year and has responsibility for the "design, development, construction, establishment, operating and maintenance of the INTELSAT space segment and, . . . for carrying out any other activities which are undertaken by INTELSAT." Id. Art. X. It is composed of Signatories with an investment share, individually or in groups, not less than a certain, annually determined minimum level. The membership criteria are such that all regions of the world have a representative. The Board uses a weighted voting procedure. Id.

Finally, there is an Executive Organ headed by a Director General who is the INTELSAT Chief Executive and legal representative. Id. Art. XI. The Executive Organ is located in Washington, D.C., and manages the daily operations of INTELSAT.

functioning on a commercial basis.[166] Each INTELSAT Signatory contributes to the capital requirements and receives a return on its investment. Contribution and return is determined by the concept of the "investment share". A Signatorie's investment share is proportional to its utilization of the INTELSAT space segment.[167]

INTELSAT's main objective is provision of the space segment required for international public telecommunication services to all areas of the world, on a commercial basis.[168] Approximately 80% of INTELSAT's revenue is from international telephone traffic.[169] INTELSAT earth stations are owned and operated by the local entities, but INTELSAT establishes detailed specifications and operating rules.[170] Domestic telecommunication services may be provided so long as they do not impair INTELSAT's main objective of international service.[171]

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167. Id. Art. 6(a). In 1982 each Signatory received a 15.9 % return on their investment share; the target average is 14 %. 1983 INTELSAT Annual Report, supra n. 57, at 28.

168. INTELSAT Agreement, supra n. 164, Art. III (a). The "space segment" consists of "the telecommunications satellites, and the tracking, telemetry, command, control, monitoring and related facilities and equipment required to support the operation of these satellites..." Id. Art. I (h).

169. 1983 INTELSAT Annual Report, supra n. 57, at 29.

170. Leive, The Intelsat Arrangements, in "Legal Implications of Remote Sensing From Outer Space", at 167 (Matte & DeSaussure ed. 1976).

171. INTELSAT Agreement, supra n. 164, Art. III (c).

The practice of leasing spare satellite transponder capacity to states for domestic telecommunication started in 1975 with service to Algeria.[172] This practice expanded and over 25 states, mainly developing countries, now use INTELSAT for domestic telecommunications.[173] In recent years, domestic lease service revenues have accounted for approximately ten percent of INTELSAT's total revenue.[174] Because the INTELSAT satellites and earth stations were designed for international telecommunications, however, INTELSAT is not technically well suited to provide all the domestic telecommunications services developing countries need.[175]

Originally, INTELSAT would not invest in new space segment resources to provide for domestic capacity.[176] Recently, INTELSAT has taken action that may lead to improved domestic telecommunication services for developing nations. INTELSAT is establishing two new systems. "Vista" will provide two-way, thin-route, low-density telecommunication service to rural,

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172. Pelton, supra n. 162, at 21.

173. Id.

174. 1983 INTELSAT Annual Report, supra n. 57, at 19.

175. For a description of a satellite telecommunication system designed for service to rural areas, see infra n. 238.

176. Kelley, The Present Status and Future Development of the INTELSAT Leased System, in "A Collection of Technical Papers", 419, 422, AIAA 8th Communications Satellite Conference (1980).

isolated communities.[177] "INTELNET" will provide one-way data distribution to remote areas using microterminals as small as two feet.[178]

Another INTELSAT program that has proven beneficial to developing countries is the Assistance and Development Program. This program, which started in 1978, provides assistance to INTELSAT Signatories and non-members on the design, planning, construction and operation of earth station facilities. Over 60 countries have benefited from this program.[179] Under this program, INTELSAT will provide assistance to countries for implementation of Vista or INTELNET.[180]

Members of INTELSAT are not totally free to use or establish domestic or international satellite telecommunications systems of their own. A certain "priority" has been granted to the

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177. Vista will provide communication for voice, telex, teletype and low-speed data. It will allow domestic, regional and international communication with remote areas. INTELSAT, New Directions For INTELSAT: Satellite Communications for Development, Chapter V (1984) [hereinafter cited as New Directions]. As part of this plan INTELSAT approved changes in standards which will permit use of smaller, less expensive earth stations. Lowndes, supra n. 61.

178. New Directions, supra n. 177, at Chapt. VI.

179. 1983 INTELSAT Annual Report, supra n. 57, at 24. This program is run by four full-time INTELSAT engineers, and has an annual budget of about $500,000. Montgomery, Algeria Exemplifies Telecommunications in Developing Nations, Satellite Communications 16, (July, 1984).

180. New Directions, supra n. 177, Chapt. V.

INTELSAT system by its members. In the Preamble to the INTELSAT Agreement the parties expressed the goal of forming a single global satellite telecommunications system. To achieve that goal, members accepted certain limitations on their right to establish or use other satellite services. Three classes of satellite telecommunications services are recognized in the Agreement: domestic, international and specialized.[181] Since the primary INTELSAT objective is the provision of international services, limitations on the establishment or use of non-INTELSAT satellites for domestic or specialized service are the least restrictive. The member must merely consult with INTELSAT to ensure "technical compatibility" with the existing and planned INTELSAT space segment.[182] On the other hand, a member desiring to establish or use a non-INTELSAT satellite for international service must consult to ensure technical compatibility and to ensure such action will not cause "significant economic harm" to the INTELSAT system.[183] This provision, whose main proponent was the U.S., was added due to

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181. Specialized services include space research, meteorological and earth resource services. INTELSAT Agreement, supra n. 164, Art. 1 (l).

182. Id. Art. XIV (c) & (e). This consultation is aimed at assessing potential interference to the INTELSAT system. Galante, Intellink Vol. 1, No. 6, at 9 (1980). A number of such systems have successfully been coordinated. See Matte, supra n. 146, at 129-31.

183. INTELSAT Agreement, supra, n. 164, Art. XIV (d).

a concern that establishment of other international or regional systems could undermine the economic viability of INTELSAT.[184]

While the consultation procedure of Article XIV is mandatory, the obligation of a Signatory to comply with the findings of INTELSAT is not. INTELSAT merely makes recommendations.[185] The political force of such recommendations has never been tested, because all systems submitted for consultation have been approved.[186] The non-INTELSAT satellite systems established for regional telecommunications have been on a

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184. See Matte, supra n. 146, at 134; and Statement of Santiago Astrain, INTELSAT Director General, Hearings on International Communications Services Before the Subcommittee on Communications of the House Committee on Interstate and Foreign Commerce, 95th Congress, 1st Sess., at 257 (1977).

Although the Agreement does not define "significant economic harm", a test is used which examines the potential impact on INTELSAT costs and utilization charges, planning and operations, and the Signatories' investment. See Matte, supra n. 146, at 134.

185. INTELSAT Agreement, supra n. 164, Art. XIV. Nevertheless, one unconfirmed report indicates INTELSAT may interpret a failure to follow such a recommendation as a breach of the INTELSAT Agreement. The report acknowledges this would be a "long stretch". Intelsat Squabble, AWST, Sept. 17, 1984, at 15. A more realistic potential is that if a Signatory disregards a finding, the Assembly of Parties may conclude the Signatory should be "deemed to have withdrawn from Intelsat." Lowndes, Eutelsat Seeks Guarantee of Monopoly Inside Europe, AWST, Oct. 1, 1984, at 139, 142.

186. As a result of consultation, however, India and Indonesia had to make certain changes in their systems. First Report of the Advisory Committee for the 1985 WARC on the use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing It, at 4-37 to 4-38 (1983) (available from FCC) [hereinafter cited as 1983 U.S. WARC Report].

small scale and have not significantly detracted from potential INTELSAT business.[187] INTELSAT's primacy in international telecommunications has been unchallenged, and the system has remained very successful.

INTELSAT's viability may be threatened, however, by proposals currently before the FCC, which could result in the U.S. being the first INTELSAT member to permit international telecommunication services in direct competition with INTELSAT.[188] Both the INTELSAT Meeting of Signatories and the Assembly of Parties have adopted unanimous resolutions directed against such actions.[189] They are a clear signal that approval of these proposals would be of great concern to most nations. The developing countries are especially concerned. They believe such competition would lead to price increases.[190] Another serious concern is that if one nation permits competition with INTELSAT on international routes, others,

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187. For a discussion of systems coordinated under Art. XIV (d) of the Agreement, see Matte, supra n. 146, at 135-39.

188. Klass, supra n. 77; and Godwin, supra n. 163, at 297.

189. Godwin, supra n. 163, at 331.

190. INTELSAT charges all users the same rate, whether on a high-traffic route such as the transatlantic, or on a low-traffic route typical of those used by developing countries. Thus, there is cross-subsidization which helps the developing countries. These countries believe that if INTELSAT loses traffic on their most lucrative, high-density routes, this subsidy will decrease or disappear. Another Deregulation Quandry, AWST, Aug. 27, 1984, at 9 (editorial).

particularly Japan and Western European countries, will follow. This multiplication of international satellite telecommunication systems would further exacerbate orbit/spectrum crowding.[191] Regardless of the merits of these proposals, their approval, if it occurred prior to the Space WARC, would have serious political effects.[192]

At the Space WARC INTELSAT will seek to ensure their continued access to the orbit/spectrum resource. INTELSAT will also attempt to secure support from their member states, who are all ITU members.[193] In fact, efforts to secure that support have already begun.[194]

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191. Klass, _supra_ n. 77, at 171.

192. Even if these proposals are not approved, concern has been expressed that "the damage has been done" because developing countries see the potential that another administration could reverse the decision. _Id_. "U.S. credibility on technical issues may be questioned if the U.S. is still seen as provoking threats to the INTELSAT system." Hudson, _Developing Country Orbit/Spectrum Interests: An Analytical Framework_, at 5, paper presented at IIC 1984 Annual Conference, Berlin (Sept. 21-23, 1984).

193. INTELSAT Agreement, _supra_ n. 164, Art. XIX (a) (ii).

194. One INTELSAT report which was sent to Signatories and users, states that "the objective of the INTELSAT System Members and Users at the Conference should be to ensure the availability to their system, under any planning method agreed upon at the WARC, of the adequate orbit and spectrum resources which are necessary for the orderly growth and development of the INTELSAT System." INTELSAT, WARC-ORB 85/88, 3 (1984). INTELSAT has also made several contributions to the ITU in their Space WARC preparations. See INTELSAT, _Contributions to the Conference Preparatory Meeting (CPM)_, (Feb. 29, 1984).

2.3.2 INTERSPUTNIK

In 1971, the USSR and eight other socialist states entered into an agreement creating INTERSPUTNIK[195] as an "international system of communications via satellites".[196] The USSR did not join INTELSAT in 1964 due to a number of political reasons.[197] While any country may become a member of INTERSPUTNIK,[198] few additional states have joined this organization. As with INTELSAT, member states or their recognized operating agencies own their earth stations, and INTERSPUTNIK supplies the space segment.[199] The space segment may be owned by INTERSPUTNIK, or by members who possess such systems.[200]

The first satellites used by INTERSPUTNIK were Molniya satellites of the USSR, on which INTERSPUTNIK leased communication channels. These satellites, which have been the "mainstay of the Soviet space-based communications network", do

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195. "Agreement on the Establishment of the INTERSPUTNIK International System and Organization of Space Communications", Nov. 15, 1971, U.N.T.S. 862:3 [hereinafter cited as the INTERSPUTNIK Agreement].

196. Id. Art. 4(1).

197. See Matte, supra n. 146, at 141-2.

198. INTERSPUTNIK Agreement, supra n. 195, Art. 22.

199. Id. Art. 4.

200. Id.

not use the geostationary orbit.[201] Recently, the USSR started using geostationary satellites for some of their communication needs, and INTERSPUTNIK has leased channels on them.[202]

The INTERSPUTNIK Agreement requires it to coordinate its activities with the ITU and to cooperate with other organizations involved with satellite telecommunications.[203]

2.3.3 INMARSAT

The Convention establishing the International Maritime

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201. Johnson, The Soviet Year In Space: 1983 17, (1984). Molniya satellites use Molniya orbits which have low perigees (400 - 600 km) and high apogees (39,000 - 40,000 km). Due to their orbital mechanics they spend over 75% of their orbital period high over the northern hemisphere. This permits long intervals of communication in that area. To provide continuous communication, the USSR normally maintains 12 satellites in Molniya orbits. Id. at 17. Geostationary satellites are unable to serve large areas of the USSR because of their high latitudes. See supra n. 8.

202. U.N., Multilateral Intergovernmental Co-Operation in Space Activities, U.N. Doc. A/CONF. 101/BP/10, at 33 (Jan. 30, 1981) [hereinafter cited as BP/10].

203. INTERSPUTNIK Agreement, supra n. 195, Art. 7.

204. "Convention on the International Maritime Satellite Organization", Sept. 1976, 31 U.S.T. 1, T.I.A.S. No. 9605, 15 ILM 1052. [hereinafter cited as INMARSAT Convention]. As with INTELSAT, the Convention is supplemented by the Operating Agreement on the International Maritime Satellite Organization which may be signed by a government or its "competent entity". Id. Art. 2.

Satellite Organization (INMARSAT) was signed in 1976.[204] It came into force in 1979,[205] and INMARSAT became operational in February, 1982.[206] The purpose of INMARSAT is to provide the space segment for improved maritime communications in order to aid safety at sea, ship management, public correspondence and radiodetermination capabilities.[207] Although not a commercial venture, INMARSAT is a hybrid organization similar to INTELSAT, and must operate on "a sound economic and financial basis . . ."[208] Membership in INMARSAT is open to all nations,[209] and 40 states including the U.S. and USSR are members.[210] Moreover, INMARSAT seeks to serve all areas of the world where there is a need for maritime communications,[211] and its space segment is available for use by ships of all nations, members and non-members, on a non-discriminatory basis.[212] Approximately 2,700 vessels from 60 nations use INMARSAT.[213]

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205. Matte, _supra_ n. 146, at 149.

206. U.N. Doc. A/CONF.101/BP/IGO/9, at 25, (April 21, 1982).

207. INMARSAT Convention, _supra_ n. 204, Art. 3.

208. _Id_. Art. 5 (3).

209. _Id_. Art. 32.

210. Lenorovitz, _West Screens Inmarsat Technical Bids_, AWST, Jul. 30, 1984, at 18.

211. INMARSAT Convention _supra_ n. 204, Art. 3 (2).

212. _Id_. Art. 7.

213. Lenorovitz, _supra_ n. 210, at 19.

INMARSAT leases transponder capacity on three satellites in the geostationary orbit, and is planning to have up to nine of its own geostationary satellites in the late 1980's.[214] INMARSAT is also considering amending its rules to permit provision of aeronautical communications.[215] At the Space WARC, INMARSAT will attempt to ensure the continued viability of their future plans.

A consultation procedure similar to that embodied in Article XIV of the INTELSAT Agreement,[216] but not as encompassing, is included in the INMARSAT Convention.[217] If a member, or any person it has jurisdiction over, intends to establish or use a space segment for a purpose similar to those of INMARSAT, it must notify INMARSAT "to ensure technical compatibility and to avoid significant economic harm to the INMARSAT system."[218]

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214. Id. The INMARSAT Convention stresses use of "the most advanced suitable space technology available . . . consistent with the most efficient and equitable use of the radio frequency spectrum and of satellite orbits . . ." INMARSAT Convention supra n. 204, Preamble.

215. Lenorovitz, supra n. 210, at 19.

216. See supra n. 182-185 and accompanying text.

217. INMARSAT Convention, supra n. 204, Art. 8.

218. Id. Art. 8 (1). Consultation is not required for other types of systems.

After consultation, INMARSAT makes a non-binding recommendation.[219] No such consultation has yet been accomplished.

2.4 Regional Common User Organizations

2.4.1 EUTELSAT

In 1977, the European Space Agency (ESA) adopted a resolution calling for a separate organization to operate the ESA communication satellites on a commercial basis.[220] Shortly thereafter, 17 European telecommunication organizations signed the Interim EUTELSAT Agreement.[221] By 1984, organizations from 24 European nations had joined EUTELSAT.[222] EUTELSAT's main objective is constructing, establishing, operating and

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219. Id. Art. 8.

220. AWST, Feb. 28, 1977, at 52.

221. "Agreement on the Constitution of a Provisional Telecommunications Satellite Organization." Extracts of this agreement can be found in Matte, supra n. 146, at 312. See also "ECS", The European communication satellite, 50 Telecommunications Journal 513, 516 (1983).

222. Greece recently became the 24th European Nation to sign the definitive EUTELSAT treaty. Satellite Communications, at 16 (Sept. 1984).

maintaining the European space segment for a wide range of regional or domestic public telecommunication services such as telephony, data exchange, television distribution, and business services.[223] EUTELSAT has two geostationary satellites and is preparing specifications for its second generation satellites, the first one of which is targeted for launch in 1989.[224]

2.4.2 PALAPA-B

The PALAPA-B system is owned and operated by Indonesia. It followed the PALAPA-A system which was used by Indonesia starting in 1976. The system, when complete, will consist of three geostationary satellites.[225] It is an extension of the Indonesian domestic system, and also serves Maylaysia, Singapore, Thailand and the Philippines. The system carries

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223. UNISPACE 82, _supra_ n. 27, at 84.

224. Kerver, _Europe's Satellite Television Future_, satellite Communications, at 33, 34 (July 1984). The original EUTELSAT satellites were coordinated with INTELSAT. It was determined they would be technically compatible with the INTELSAT system, and would not cause significant economic harm because most circuits carried by the satellites would have been carried by the European terrestrial network and not by INTELSAT. Approval, however, was only granted for a period of five years. See Matte, _supra_ n. 146, at 135-7. Currently, EUTELSAT and INTELSAT are negotiating a further agreement regarding European telecommunication traffic. Lowndes, _supra_ n. 185, at 139.

225. _New Satcom Planned for Indonesia_, AWST, Jan. 14, 1980, at 58.

domestic telecommunication services between remote areas of a country, as well as international services between remote areas of one country and remote areas of another country.[226] INTELSAT traffic to and from urban areas of these countries is not affected.[227]

The PALAPA system is distinct from all other common user organizations in that the space segment is owned and operated by a country, not an organization. Other nations may lease use of the space segment, but they have no ownership interest and no planning or managerial control.

2.4.3 ARABSAT

The Arab Corporation for Space Communications (ARABSAT), was formed by the countries of the Arab League in 1976, with the objective of establishing, operating and maintaining a telecommunication system to serve the Arab region.[228] Two

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226. Kosuge, Space Telecommunication and Regional Cooperation, XXII Colloquium 53 (1979).

227. Although problems were encountered, these satellites were successfully coordinated with INTELSAT. See 1983 U.S. WARC Report, *supra* n. 186, at 4-37.

228. UNISPACE 82, *supra* n. 27, at 83. For an unofficial English translation of this agreement see, Manual on Space Law, Vol. IV, at 345 (Jasentuliyana & Lee ed. 1979).

geostationary satellites are planned. The first satellite will be launched in late 1984 or early 1985, and the second in mid-1985.[229] The system will be capable of providing regional and domestic telephony, telex, data transmission and television, as well as community television.[230]

2.4.4 Other Potential Regional Systems

The African Union of Posts and Telecommunications is planning a feasibility study for an African regional satellite network. A consortium of 12 French-speaking nations has already completed a preliminary study.[231] In addition, five South American nations are in the process of planning a two satellite system to provide service within the Andean region.[232]

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229. Arabsat Satellites Nearing Completion, AWST, Sept. 3, 1984, at 119-20.

230. UNISPACE 82, supra n. 27, at 83. See also U.N. Doc. A/CONF.101/BP/IGO/4, "ARABSAT Satellite Communications System". These satellites were coordinated with INTELSAT. Matte, supra n. 146, at 137-8.

231. AWST, Aug. 20, 1984, at 11.

232. Industry Observer, AWST, Oct. 15, 1984, at 13.

2.5 National Systems

Due to economic, technological, or political motivations, an increasing number of states have established nationally owned and operated domestic satellite telecommunication systems. Even developing countries are beginning to move in that direction.[233] At the Space WARC, many of these developing countries will be seeking an orbit/spectrum reservation of their own in the increasingly crowded geostationary orbit. This section reviews the status of national systems for domestic telecommunications. But prior to examining those systems, it is important to understand why many developing countries believe so strongly that they need satellite telecommunications, and why they might consider a national system instead of merely using INTELSAT or a regional system.

Long distance communications linking rural communities with other rural and urban areas of a country are very important to growth and development. They can provide assistance in

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233. U.N. Doc. A/CONF.101.BP/IGO/9, April 21, 1982, at 15. Indonesia was the fourth nation and the first developing country to establish a domestic satellite telecommunication system. Sunaryo, The Indonesian Space Program and its Socio-Cultural Impact, at 2, paper presented at IIC 1984 Annual Conference, Berlin (Sept. 21-23, 1984).

education, agriculture, health and other activities. In fact, telecommunications has been likened to transportation and electrification as "essential infrastructure without which rapid economic and social development may be impossible."[234] A recent ITU study indicated the cost/benefit ratio for investment in telecommunications can be as high as 100 to one for developing countries, and another study showed there is an 80% correlation between telephones per capita and per capita GNP.[235]

As the benefits which flow from telecommunication become more evident to developing countries, it is not surprising they want to share in them. In developing countries, however, the costs of providing long distance telecommunication services have traditionally been very high due not only to the long distances involved, but also to the hostile terrain often encountered. Moreover, in developing countries the need for telecommunication services must compete with other pressing problems for the scarce funds available.[236] Yet many of these countries will find a satellite telecommunications system

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234. Parker, Communication satellites for rural development, Telecommunications Policy, at 309 (Dec. 1978).

235. Pelton, *supra* n. 162, at 19.

236. The Asian Development Bank, for example, only makes available 3.5 percent of its funds for both telecommunications and transport. *Id*.

significantly more economical than its terrestrial alternatives. This is so because satellite systems are generally cost-insensitive to distance, more reliable, easier to maintain (for the ground stations), and offer a much greater degree of flexibility than terrestrial systems.[237] In general, most developing countries which desire nation-wide telecommunications service will find a satellite system an essential component. Systems optimally designed for developing countries, however, have not been available in the past.

INTELSAT and common user organizations have not proven adequate for the needs of many developing countries. The INTELSAT space segment, while used by developing countries, was designed for international traffic; the associated earth stations are larger and much more expensive than a domestic system should be.[238] Thus, while INTELSAT could provide

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237. Parker, supra n. 234, at 311-12.

238. In the past, INTELSAT earth-stations have cost $2 million or more. Such a large investment is only justified for a developed terrestrial system with sufficiently large traffic. U.N. Doc. BP/15, supra n. 62, at 7. The objective for a rural system should be to place a small number of telephones with satellite links in as many places as possible, rather than having a large number of telephones in fewer locations. Appropriate Modern Telecommunications Technology for Integrated Rural Development in Africa (AMTT/IRD), 49 Telecommunication Journal 677, 682 (1982). For a further discussion of satellite systems optimally designed for use by a developing country, see Parker, supra n. 234, at 311-12; and Pierce, A global-domestic (GLODOM) satellite system for rural development, 46 Telecommunication Journal 745, (1979).

telecommunications service for urban areas of many developing countries, it could not provide affordable service to sparsely populated and remote rural areas.[239] Some countries have found the answer in regional satellite systems. Such systems, however, are only established or planned in a few areas of the world.

As a result of this situation, certain developing nations have concluded they will need to establish their own satellite system to meet their telecommunication needs.[240] In order to do so they need three things -- financial resources, technical resources, and access to the geostationary orbit/spectrum resource. It is through the Space WARC that they are seeking to establish their "guaranteed access" to the latter, while they wait for the former.

The trend toward nations owning and operating their own satellite telecommunications system is not necessarily irreversible. INTELSAT's new "Vista" and "INTELNET" systems may provide satisfactory domestic satellite service on a

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239. An ITU report acknowledges that the growth in telecommunications has been "largely for the international services and, in the developing countries, [has] been observed to some degree in the capitol cities. In many developing countries little has been achieved in the rural areas." U.N. Doc. BP/15, supra n. 62, at 1.

240. Some of these nations are also motivated by a desire to become regional satellite powers. See infra n. 423 and accompanying text.

planned basis.[241] A movement for creation of new regional systems would also help ameliorate this trend.

2.5.1 The United States

The U.S. has the largest number of geostationary satellites for domestic telecommunications of any single country. In the U.S., any qualified entity may establish and operate a domestic satellite telecommunications system.[242] As a result of this open entry, numerous systems providing the space segment for telephone, television and most other telecommunication services are in operation.[243]

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241. See supra n. 177-78 and accompanying text.

242. This "open entry" policy is a result of an FCC decision known as the "Domsat" or "Open Skies" decision. See Domestic Communication-Satellite Facilities, First Report and Order, 22 FCC 2d 86 (1970); Second Report and Order, 35 FCC 2d 844 (1972), modified, 38 FCC 2d 665 (1972). But because of orbital saturation this open entry policy may not last. See supra n. 87 and accompanying text.

243. Many U.S. corporations own and operate domestic satellite telecommunication systems. See generally, Matte supra n. 146, at 165-69. SBS and AT&T recently each had new satellites launched by the same U.S. space shuttle. Competing Company Satellites Share Discovery's Payload Bay, AWST, Sept. 10, 1984, at 106.

2.5.2 The USSR

The USSR also has a large system of telecommunication satellites. Although their Molniya series satellites do not operate in the geostationary orbit,[244] three other satellite systems do. These systems are the Ekran, Raduga and Horizon. Ekran satellites provide direct television broadcast services. Raduga satellites provide domestic telecommunication services to the southern regions of the USSR and are also used by INTERSPUTNIK. The Horizon (or Gorizont) system primarily provides international telecommunications service.[245] Use of the geostationary orbit by the USSR has been increasing. Six geostationary satellites were launched in 1982 and six more in 1983.[246] By the end of 1983 the USSR had applied to the ITU for 22 geostationary orbit slots.[247]

2.5.3 Canada

Canada has been a long time user of telecommunication

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244. See _supra_, n. 201 and accompanying text.

245. See Matte, _supra_ n. 146, at 170; and Johnson, _supra_ n. 201, at 18-19.

246. Johnson, _supra_ n. 201, at 18.

247. _Id_. at 19.

satellites. It has six satellites in the geostationary orbit providing extensive telecommunication services and conducting experiments with direct television broadcasting.[248] Plans for next-generation satellites are under way.[249]

2.5.4 Other Nations

Other nations with geostationary satellites serving domestic telecommunications needs are Indonesia (PALAPA-B), India, Italy, France, West Germany and Japan. Countries with plans for geostationary satellites include Mexico, Brazil, Columbia, Israel, China, Algeria, Nigeria, Pakistan, the United Kingdom,

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248. Matte, _supra_ n. 146, at 171-72.

249. _Telesat Seeks New Rates, Market Plan_, AWST, Sept. 3, 1984, at 177.

250. See Hudson, _supra_ n. 192, at 16; 1983 INTELSAT Annual Report, _supra_ n. 57, at 21; and Embratel, _Brazil Moving Into Its Own_, Satellite Communications, at 24 (July 1984).

The reason for Australia's decision to establish a domestic satellite telecommunication system is typical of many countries. The decision was made after a study concluded "[i]t is in Australia's interests to establish the orbital positions it will need . . . and to ensure that these positions are not lost to her by allocation to other countries . . . " Commonwealth Government (Australia) Task Force, _National Communications Satellite System, Report_, at 84, (1978), as quoted in Matte, _supra_ n. 146, at 174. The "AUSSAT" system will consist of three Ku band satellites which will carry telephone, television, radio and business communications to remote corners of the country. First launch is scheduled for mid 1985. 49 Telecommunication Journal 190 (March 1982).

Luxemborg, Saudi Arabia, and Australia.[250] Argentina is completing a feasibility study on a domestic satellite telecommunication system.[251]

In summary, while many nations of the world with a need for domestic satellite communications service secure that service through common user systems, there is a trend toward individual systems. That trend is a result of numerous factors, one being a concern that the geostationary orbit/spectrum resource is becoming saturated and that nations must act now to secure their access. The trend, however, is not necessarily permanent.[252]

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251. AWST, Sept. 10, 1984, at 25.

252. Additionally, most nations will not have the resources or need for a satellite system of their own in the foreseeable future. See Dizard, supra n. 154, at 14.

Chapter 3

THE CURRENT ITU REGULATORY REGIME FOR THE GEOSTATIONARY ORBIT: THE FIRST-COME, FIRST-SERVED RULE

The impetus for the Space WARC was the developing countries' dissatisfaction with the current regulatory procedure for ensuring "equitable access" to the orbit/spectrum resource. This chapter examines that procedure by focusing on the *processes which culminate in the "first-come, first-served"* rule, and the nature of the rights protected by that rule.[253]

3.1 The Process of Acquiring Vested Rights

Management of the orbit/spectrum resource is necessary to insure interference-free use of satellite telecommunication systems. This management is handled at the international level

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253. The Plans for the Broadcasting Satellite Service are a separate part of the ITU regulatory regime and are examined *infra* Section 5.1.

mainly by the ITU.[254] As previously mentioned, one important duty of Administrative Conferences is the allocation of radio frequencies to the various services. Allocation is a central part of the *ITU's management process. It is defined as* "[e]ntry in the Table of Frequency Allocations of a given frequency for the purpose of its use by one or more terrestrial or space radiocommunication services . . ."[255]

Allocations are made to services, not countries. Following allocation, however, countries may enter into agreements for further distribution of frequencies. Two or more ITU members may conclude "special agreements" which are in accord with the general allocation scheme, for the sub-allocation to particular

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254. Rules for frequency spectrum management also exist at the national, regional and bilateral level.

255. 1982 Radio Regulations, supra n. 1, Art. 1, No. 17.

The Table of Frequency Allocations divides the world into three regions and reflects the distribution of radio frequencies to them. The Table divides the frequency spectrum into over 500 separate frequency bands. Allocations have been made up to 275 *GHz*. Id. Art. 8. *Most frequency bands are* allocated to the same service world-wide, but allocations of a band may differ from one region to another. Two other factors further complicate the Table. First, different radio services are often allocated the same frequency band. The ITU has established rules *for* sharing frequency allocations, setting priority among the services. Id. Art. 8, Section 8. Second, there are many footnotes to the Table. These footnotes correspond to particular frequency bands and indicate additional allocations, alternate allocations, and the manner in which certain states deviate from the allocation scheme. Id. Art. 8, Sections 9, 10 & 11.

countries of a combination of frequency bands and services.[256] When such arrangements are made on a multilateral basis they are called "plans." The sub-allocation process, called "allotment," is defined as the entry of a designated frequency in an agreed Plan, for use by one or more administrations in a radiocommunication service.[257] Allotment Plans are devised by a competent RARC or WARC. Currently, the only planned service using the geostationary orbit/spectrum resource is the Broadcasting Satellite Service.[258] All other services use allocated frequencies. The legal consequences of allocation and allotment are significantly different.

After frequencies have been allocated to services, or allotted to countries, they still need to be designated for use by individual stations. This procedure is not conducted directly by the ITU, but by "administrations" (the ITU term for member countries) in accordance with certain principles and rules established by the ITU. This procedure, known as "assignment," is the authorization given by an administration for one of its radio stations to use a radio frequency under

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256. 1982 ITU Convention, supra n. 2, Art. 31; 1982 Radio Regulations, supra n. 1, Art. 7.

257. 1982 Radio Regulations, supra n. 1, Art. 1, No. 18.

258. See infra Section 5.1.

specified conditions.[259] The ITU Convention sets forth principles to guide administrations in their assignments. In general, assignments must be made in accordance with the Table of Frequency Allocations, or an applicable Allotment Plan.[260]

Article 33 of the ITU Convention is very important to frequency assignment and use of the geostationary orbit in general.[261] The first paragraph of Article 33 establishes the principle that states should limit their use of the radio frequency spectrum to the minimum essential level. Two aspects of this principle are important. First, this is a goal as

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259. 1982 Radio Regulations, supra n. 1, Art. 1, No. 19. Assignments to services using the geostationary orbit also involve an orbital location.

260. Id. Art. 6, No. 342.

261. Article 33 provides:

> 1. Members shall endeavor to limit the number of frequencies and the spectrum space used to the minimum essential to provide in a satisfactory manner the necessary services. To that end they shall endeavor to apply the latest technical advances as soon as possible.
>
> 2. In using frequency bands for space radio services Members shall bear in mind that radio frequencies and the geostationary satellite orbit are limited natural resources and that they must be used efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to both, taking into account the special needs of the developing countries and the geographical situation of particular countries. 1982 ITU Convention, supra n. 2, Art. 33.

opposed to a duty; the admonishment is not "shall limit", but rather, "shall endeavor to limit." Second, no sanctions or rewards are established. Each state is the sole judge of whether they are meeting the goal. This part of Article 33 also specifies that in attempting to meet this goal, states should use the latest technology "as soon as possible". This last phrase is important. To use the latest technology, it must not only be available, but also affordable and practical. It is likely that the latest technology will be affordable and practical for the developed nations before it will be for developing ones. In such cases, the developed nations have more of an obligation than do the developing countries to see that stations seeking assignments use the latest technology.

The second paragraph of Article 33 also sets forth important principles relevant to frequency assignment. It states that radio frequencies and the geostationary orbit are "limited natural resources" which must be used "efficiently and economically" in order to ensure "equitable access". Although this is a very important concept, none of the key terms are defined. Efficient and economical use of the orbit/spectrum resource has a logical connection with the level of technology employed. Advanced technology should result in more efficient use, and probably more economical use. The requirement to use these resources "efficiently and economically" is therefore linked to the obligation to use the latest technology as soon as possible. The concept of "equitable access" will be discussed *infra*.[262]

Article 35 of the ITU Convention contains another key provision of the ITU Convention.[263] It creates the obligation for all states to ensure their stations do not cause "harmful interference"[264] to stations in other countries which are operating in accordance with the Radio Regulations. The last aspect of the rule is fundamental. In essence, it grants protection to stations which operate in accordance with the Regulations. Such protection is necessary for the long-term viability of any station. There are two methods in the Radio Regulations through which this protection against harmful interference can be vested. The first is registration by the

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262. See *infra* Section 7.1.

263. Article 35, paragraph 1 provides:

> All stations, whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other members or of recognized private operating agencies, or of other duly authorized operating agencies which carry on radio service, and which operate in accordance with the provisions of the Radio Regulations. ITU Convention, *supra* n. 2, Art. 35.

264. "Harmful Interference" is "[i]nterference which . . . seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with these Regulations." 1982 Radio Regulations, *supra* n. 1, Art. 1, No. 163.

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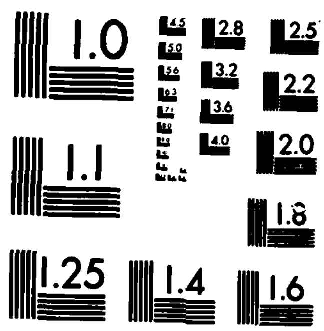

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

IFRB of an allocated frequency. The second is allotment in a Plan.

In general, when a Plan allots frequencies to countries, rights against harmful interference are vested when the Plan becomes effective. Plans are designed so that assignments made in accordance with them will not cause harmful interference. Since rights are vested at the time of allotment, the requirement of registration is merely a formality and the registration procedure is rather simple. For example, the Plan for the Broadcast Satellite Service in Regions 1 and 3 requires an administration to notify the IFRB of an assignment between three years and 90 days prior to the date it will be brought into use. The IFRB examines the notification to determine its conformity with the Convention, Radio Regulations and the Plan. Upon a favorable finding, the Board records the notified frequency and orbital slot in the Master Register.[265]

The registration procedure for allocated frequencies is quite different. Time of registration is of the essence because rights do not vest until registration, when "formal international recognition is granted."[266] Time sensitive

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265. _Id_. Appendix 30, Art. 5.2.1. Although the date of receipt of the assignment notice is placed in the Register, all assignments recorded in accordance with the Plan have equal status. _Id_. Art 5.2.2.

266. 1982 ITU Convention, _supra_ n. 2, Art. 10.4 (a).

registration schemes are not unique, they are also found in real estate and water law. In telecommunications law this practice is referred to as the "first-come, first-served" rule. The first station to be registered by the IFRB will be protected (served) against harmful interference. This rule places a premium on early use of the orbit/spectrum resource. It may also place a penalty on latecomers who have a duty to ensure their assignment will not cause harmful interference with a recorded assignment.[267]

The procedure for registration of frequencies allocated to unplanned space telecommunication services is rather complicated and time consuming. It has three steps: Advance Publication; Coordination; and Notification. Advance publication is initiated two to five years prior to bringing a station into service, by sending the IFRB information specified in the Regulations.[268] The IFRB sends that information to all other administrations, who have four months to comment on potential interference to their existing or planned space

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267. To avoid causing harmful interference, latecomers may have to alter certain technical aspects of their proposed system, such as frequency, orbital slot, or area of coverage. Conceivably, latecomers could even be prevented from establishing a particular satellite telecommunication system.

268. 1982 Radio Regulations, *supra* n. 1, Art. 11, No. 1042. This information includes: date of bringing into use; frequency range and other technical characteristics of the planned system; and geostationary orbital location. *Id*. Appendix 4.

radiocommunication services.[269] The Regulations set forth a procedure for an administration receiving comments to follow. This procedure consists primarily of bilateral negotiations between the involved administrations.[270] The main purpose of Advance Publication is to discover potential problems at an early stage in system planning, thereby facilitating the incorporation of any design changes that may be necessary.[271]

Coordination follows Advance Publication and is a similar process. Coordination, however, is based on much more detailed

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269. Id. Art. 11 Nos. 1044-1047. Comments are sent to the administration concerned with a copy to the IFRB. Id. No. 1047.

270. The administration must first attempt to meet its requirements without considering possible adjustment to the characteristics of geostationary satellite networks of other administrations. Id. Art. 11, No. 1051. If it cannot do so, the administration concerned may apply to commenting administrations to solve the difficulties. Id. These administrations then together attempt to reach "mutually acceptable adjustments" to geostationary orbit locations, frequency usage, or other characteristics; they may seek assistance from the IFRB. Id. Art. 11, No. 1050-1053.

271. DuCharme, Bowen & Irwin, The Genesis of the 1985/87 World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, VII Annals of air & Space Law (hereinafter AASL) 261, 270 (1982).

technical information regarding the system.[272] During the Coordination process administrations attempt to resolve any difficulties.[273] While IFRB assistance may be requested, Coordination is mainly a matter of bilateral negotiation.[274] Due to the rule of first come, first served, however, there is no legal obligation on an administration whose previously registered service may be interfered with, to change any characteristics of its system. The negotiating parties, therefore, do not have equal bargaining power. Although the Coordination process has not yet failed to accommodate a system, the results have not always been completely

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272. Coordination is initiated by sending specified information to the IFRB. 1982 Radio Regulations, supra n. 1, Art. 11, Nos. 1073-1074. The IFRB examines the information to determine the result of Advance Publication and to identify administrations whose services might be affected, then it sends the information they received and the results of their examination to other administrations. Id. Art. 11, Nos. 1075-1078. To determine which administrations need to be included in the Coordination process, the Regulations set out detailed criteria with a view to including any administration which might experience interference above certain levels to its space or terrestrial services as a result of the system being Coordinated. Id. Art. 11, Nos. 1059-1071.

273. Id. Art. 11, Nos. 1083-1085.

274. Id. Art. 11, Nos. 1088-1094.

satisfactory to the Coordinating administrations.[275]

Notification is required to obtain "international recognition" and protection against harmful interference for an assignment.[276] The assignment notice must reach the IFRB not earlier than three years before the date the assignment is to be brought into use, and not later than three months before that date.[277] The IFRB publishes the information in its weekly circular,[278] and examines the notice for conformity with: the ITU Convention; the Regulations, including the Table of Allocations; and the Coordination provisions.[279] If the Coordination process was not successfully completed, the Board also examines the probability of harmful interference to previously recorded assignments.[280]

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275. India "successfully" Coordinated their INSAT system with the USSR and INTELSAT, but believes that they "paid a fairly heavy and severe penalty" for the orbital location and frequencies ultimately achieved. Rutkowski, Six Ad-Hoc Two: The Third World Speaks Its Mind, Satellite Communications 22, 23 (March 1980). Indonesia also had Coordination difficulties with the USSR and INTELSAT. See 1983 U.S. WARC Report, supra n. 186, at 4-37 to 4-39. The IFRB report on this issue is overdue. See supra n. 139.

276. 1982 Radio Regulations, supra n. 1, Art. 13, No. 1491.

277. Id. Art. 13, No. 1496.

278. Id. Art. 13, No. 1499.

279. Id. Art. 13, Nos. 1502-1512.

280. Id. Art. 13, No. 1506.

If the IFRB reaches a favorable finding, the frequency assignment, orbital position, and relevant operating and technical characteristics are recorded in the Master Register.[281] If the IFRB reaches an unfavorable finding, the assignment may be registered under certain limited circumstances which ensure harmful interference will not be caused to previously recorded assignments.[282] When an assignment is registered, the date of the notice is included in the Master Register. This date determines the rights of the assigned station. These rights, and the corresponding duties of administrations, will now be examined.

3.1.1 The Legal Nature of Vested Rights

When an administration has recorded an assignment of a geostationary orbital position and its associated radio frequencies in the Master Register, it has the right to _use_

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281. _Id_. Art. 13, No. 1526.

282. Where the Board's findings were negative, an assignment may be recorded: 1) if the station has operated for four months, together with the station that was the basis for the unfavorable finding, without causing harmful interference _Id_. Art. 13, No. 1544; or (2) if the administration agrees to use the notified assignment on the basis of non-interference and to terminate interference immediately if it results. _Id_. Art. 13, Nos. 1520-1522. Technically, however, an administration can always insist that an assignment be recorded even if it will cause harmful interference. The Radio Regulations require cessation of such operations, but do not require cancellation of the registration. _Id_. No. 1559.

that assignment. This right to use is not tantamount to a property right. It is not ownership.[283] This applies whether the registration was made on a first-come, first-served basis, or in accordance with a Plan.[284]

This right to use a recorded assignment is ensured by the protection given to a recorded assignment against harmful interference, but it has its limits. First, the use should be in accordance with the characteristics recorded in the Master Register. If an administration desires to change the characteristics of a recorded assignment, the proper procedure to follow is the standard Notification procedure set out for new assignments.[285] If the IFRB receives information that a station is not operating in accordance with its recorded

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283. See Leive, Regulating the Use of the Radio Spectrum, 5 Stanford J. Int'l L. 21, 35 (1970).

284. "No ITU plan, . . . has to-date, explicitly conveyed property rights, in orbit or spectrum." FCC, Second Notice of Inquiry, supra n. 79, at 11. See also Jakhu, supra n. 86, at 287-88. Nevertheless, the right to sell or rent a geostationary orbital position allotted in a plan has been discussed in the literature. See infra n. 412 and accompanying text. Nothing in the Broadcasting Satellite Service Plan explicitly prohibits such action. Because of technical requirements, however, it would be difficult to accomplish. No sales, rentals or other such arrangements have been initiated.

285. 1982 Radio Regulations, supra n. 1, Art. 13, No. 1548.

286. Id. No. 1574. The IFRB also has the duty to routinely contact administrations at least every two years to confirm that assignments are being used in accordance with recorded characteristics. Id. No. 1569.

characteristics, it must consult the administration involved.[286] After consulting with the administration, the IFRB may cancel or modify the registered entry; however, they may only do so if the administration agrees.[287] Thus, the obligation to use an assignment in accordance with its recorded characteristics is dependent upon the good faith of the administrations.

The right to use a recorded assignment also involves a duty to notify the IFRB if use is suspended for a period of 18 months,[288] or permanently discontinued.[289] If the Board is notified of a suspension in use, or otherwise discovers such a suspension, and that suspension in use has existed for two

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287. Id. No. 1574.

288. Id. Art. 13, No. 1570.

289. Id. Art. 13, No. 1573.

290. Id. Art. 13, Nos. 1571 & 1572. A suspension in use of less than 18 months is not addressed by the Regulations. While use should be "regular" and without suspension of more than 18 months, it does not have to be continuous. Id. No. 1571. Theoretically, an administration could have more than one recorded assignment per satellite, and move the satellite from one orbital position to another, so long as any one assignment was not out of use for 18 months. The assignments would have to be identical, except for orbital position, for one satellite to meet the recorded characteristics of each assignment. While such a practice would not conserve the orbit/spectrum resource, it would add flexibility to a satellite telecommunication system. At one time, INTELSAT moved a satellite from a recorded position over the Indian Ocean to a recorded position over the Atlantic because the demand for service was much greater and the satellite could be used more efficiently. See 1978 INTELSAT Annual Report, supra n. 50, at 21.

years or more, a mark is made against the entry in the Master Register.[290] Thereafter, the assignment is not considered in the Notification procedure for other assignments, and is not entitled to protection against harmful interference from subsequently recorded assignments.[291] Moreover, before the assignment can be brought back into use, it must complete Coordination and Notification, and if successful, the new date on which the assignment is brought back into use is recorded in the Master Register.[292] When the Board is notified of the permanent discontinuance of a recorded assignment, the entry is deleted from the Register.[293]

Subject to the above rules regarding suspension and cancellation, the right to use an assignment recorded in the Master Register is not limited in time. Moreover, mere changes to the name of a station[294] or its date of bringing into use do not require Coordination and Notification.[295] Therefore, an

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291. 1982 Radio Regulations, supra n. 1, Art. 13, No. 1572.

292. Id. Nos. 1572 & 1513.

293. Id. No. 1573.

294. A "station" is defined as "[o]ne or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment, necessary at one location for carrying on a radiocommunication service . . ." Id. Art. 1, No. 58. A geostationary telecommunication satellite is a station located in the geostationary orbit.

295. Id. Art. 13 No. 1548.

administration has a right to replace a satellite with one having the same basic technical characteristics. This right to replace an old satellite with a new one of the same type makes a recorded assignment potentially perpetual. Consequently, the right to use has been referred to as "a right to perpetual use."[296]

There are three qualifications to the general rule that the right to use a recorded assignment is perpetual. The first involves planned services. A plan may state a time limit for rights acquired pursuant to it. For example, the 1977 Broadcasting Satellite Service Plan was designed for a period of fifteen years.[297] When it is revised, however, it is reasonable to conclude that assignments recorded in accordance with the Plan will be provided some measure of continued protection. Therefore, while the rights acquired under this Plan are not legally "perpetual", they may in fact continue for a very long time.

The second qualification to the right of perpetual use involves an experimental procedure initiated by Resolution No.

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296. Jakhu, _supra_ n. 86, at 289.

297. 1982 Radio Regulations, _supra_ n. 1, Appendix 30, Art. 16. This Plan, however, will not automatically terminate at the end of fifteen years; it remains in effect until revised by a competent WARC. _Id_.

4 of the 1979 WARC.[298] This Resolution provides that a recorded assignment of a geostationary orbital position and associated radio frequencies is considered discontinued when the period of operation shown on the assignment notice expires. Nevertheless, there are broad exceptions to this general proposition which significantly mitigate its effect.[299] Thus, even under this Resolution, if an administration desires to perpetuate a recorded frequency/orbit assignment, it should be able.

The final qualification to the right of perpetual use is contained in another Resolution of the 1979 WARC. Resolution No. 2 provides that registration of frequency assignments and their use "should not provide any permanent priority for any individual country or groups of countries . . ."[300] While this statement sounds like a limit on the right of perpetual use, it is not enforced by any regulations and is only a statement of

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298. Id. Resolution No. 4. This experimental procedure was to last from July 1980 until the Space WARC.

299. For example, the period of operation can be extended as long as the characteristics of the assignment remain unchanged. Id. para. 1.2. This could be accomplished by replacing the original satellite with a new one having the same characteristics. Additionally, a new satellite with different technical characteristics but the same orbital location and frequency may be used as a replacement, so long as Coordination and Notification are successfully carried out and the probability of interference is not increased. Id. para. 1.3.

300. Id. Resolution No. 2.

policy.

These qualifications to the "right to perpetual use" do not significantly limit it. Nevertheless, although a "right to perpetual use" may exist in law, it has not existed in fact. Because technology has advanced so rapidly, the practice has been to follow one series, or generation of satellites, with a more advanced series possessing different characteristics and requiring Coordination and Notification.[301] Past practice, however, is no guarantee of future conduct, and the potential of abuse inherent in the current regulatory regime should not be ignored. This potential of abuse is one aspect of the current regulatory regime that is disturbing to many of the developing countries. They see the orbit/spectrum resource not only being rapidly occupied, but occupied indefinitely and potentially perpetually.

The potential of abuse inherent in the current regulatory regime could be eliminated by establishment of a time-limit for registrations. The limit could correspond to the satellite life expectancy.[302] This would permit the satellite owners to

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301. An example of this practice is the successive series of INTELSAT satellites. See <u>supra</u> Section 1.2.

302. Provision could be made for an extension should the satellite remain operative for longer than expected. Similar proposals have been made in the past. See <u>infra</u> n. 355 and accompanying text.

fully recover their costs. The limit would eliminate the potentially permanent nature of registrations. This is one of the changes to the current regulatory regime that should be considered at the Space WARC.

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Chapter 4

PROLOGUE TO THE SPACE WARC

4.1 The 1927 Washington Conference

The 1927 Washington Conference established many of the basic provisions for regulating international communications which exist today. Radio stations were classified in various services according to their use. Technical and operating standards were designed for these services. A table of frequency allocations was adopted which allocated frequencies to the different services. Stations registered with the ITU were granted protection against harmful interference. Thus, the origins of the first-come, first-served rule were set.[303]

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303. For an in-depth coverage of ITU history see Codding, The International Telecommunication Union: An Experiment in International Cooperation (1952); and Leive, supra n. 95.

4.2 The 1947 Atlantic City Conferences

In 1947, two important ITU Conferences were held in Atlantic City which made significant changes to the ITU's structure and Regulations. The Plenipotentiary Conference revised the ITU Convention, and the Radio Conference, which had powers similar to a general WARC of today, revised the Radio Regulations. The many changes effected by these conferences ushered in the "period of the modern ITU".[304]

The organizational structure of the ITU was changed to a form very similar to its current structure. In so doing, the IFRB was created, and the CCIR was made a continuing, as opposed to a periodically convened body.[305] The ITU also became a specialized agency of the United Nations.

The IFRB was given duties very similar to those they currently perform. The original objective of the U.S. was for the IFRB to have "power to police the air", like an international FCC.[306] Due mainly to the refusal of nations to

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304. Codding & Rutkowski, _supra_ n. 102, at 29.

305. _Id_. at 23.

306. Leive, _supra_ n. 95, at 55.

give up sovereign powers, however, the IFRB was established with little of the authority the U.S. had desired. Nevertheless, the establishment of the Board was one of the most significant steps taken by the 1947 Atlantic City Conference.

The Radio Conference made extensive changes to the International Table of Frequency Allocations. New services and additional portions of the radio frequency spectrum were added.[307] In accordance with prior practice, the allocations were made to services rather than countries. A new concept, however, was being considered.

One of the prime objectives of the U.S. for the conferences was the ultimate establishment of an "engineered spectrum" through the use of frequency allotment or assignment plans.[308] These "plans" would have matched requirements of ITU member countries with specific frequencies, as well as with technical and operating criteria based on sound engineering principles.[309] The 1947 conferences were conducted and concluded with an expectation that plans for many frequency

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307. Id. at 25.

308. Id. at 56.

309. Id. In these respects, the original U.S. proposals are similar to many of the "plans" now being discussed. See *infra* Chapter 5.

bands would be forthcoming in the following years.[310] As it turned out, the U.S. was ultimately unsuccessful in securing adequate support for the implementation of a planning approach.[311]

The Conference established detailed provisions for the notification and registration of frequency assignments, similar to those presently existing.[312] It also established the principle of conformity. This principle required conformity with the Convention and the Radio Regulations before a station could be recorded by the IFRB in the registration column of the Master Frequency Register.[313] Otherwise, the station would only be placed in the "notification" column.

The degree of protection to be accorded to stations recorded in the registration column of the Master Register was another important issue addressed at the 1947 Conferences. Some countries wanted a "right of priority" established in the Convention, based upon prior use and notification. The U.S. considered this would be inconsistent with the objective of a

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310. Leive, _supra_ n. 95, at 56.

311. See _infra_ n. 317 and accompanying text.

312. ITU, _International Convention on Telecommunications_, Art. 11, 4 U.S.T. 570 (1947) [hereinafter cited as 1947 ITU Convention].

313. _Id._ Art. 44.

planned, engineered spectrum.[314] As a result of a compromise, the term "international recognition" was used in the Convention.[315] This phrase has been used in all subsequent ITU Conventions. Although a specific "right of priority" was not, and has never been granted in the ITU Convention, application of the first-come, first-served rule effectively grants such a right.

4.3 The 1959 WARC

In 1959, another general WARC was convened. One of the first questions it had to face was whether the goal of a planned spectrum could be realized. In the twelve years since the Atlantic City Conferences, no significant progress toward that objective had been made.[316] It quickly became obvious that a completely planned, engineered spectrum was unobtainable. Frequency demands made by the ITU member nations greatly exceeded the supply of frequencies then useable, and no

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314. Jakhu, The Evolution of the ITU's Regulatory Regime Governing Space Radiocommunication Services and the Geostationary Orbit, VIII AASL 381, 394-95 (1983).

315. 1947 ITU Convention, supra n. 312, Art. 6.1 (a).

316. Codding & Rutkowski, supra n. 102, at 34.

agreement could be reached on how to resolve the conflicting demands.[317] Therefore, that objective was abandoned.

The 1959 WARC made no significant changes to the regulatory regime established in 1947. Nevertheless, it was an important event for space telecommunications. For the first time, a "space service" was established by the Regulations, and frequencies were allocated for this service on a shared channel basis.[318] While these allocations were for space research purposes only, the launch of Sputnik and subsequent satellites demonstrated that demands on the radio spectrum would increase rapidly.[319] Therefore, a recommendation was adopted to call an Extraordinary Administrative Radio Conference in 1963 to allocate frequency bands for space purposes if warranted by technological progress.[320]

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317. Leive, _supra_ n. 95, at 68. An additional impediment was the opposition of the Soviet Union and its allies, who considered the planning approach an abridgement of their sovereignty. Codding & Rutkowski, _supra_ n. 102, at 31.

318. Jakhu, _supra_ n. 314, at 397.

319. DuCharme, Bowen & Irwin, _supra_ n. 271, at 264.

320. _Id_.

4.4 The 1963 Space EARC

In 1963, an Extraordinary Administrative Radio Conference (EARC) was held "to decide on the allocation of frequency bands essential for the various categories of space radiocommunication."[321] This Conference was an important step in the evolution of satellite telecommunication services. The EARC defined new space services and allocated approximately 4000 MHz to them on an exclusive or shared basis.[322]

One of the principal issues raised at the EARC concerned the status to be given assignments made pursuant to the new allocations. In 1961 a Resolution of the U.N. General Assembly had asserted a belief that "communication by means of satellites should be available to the nations of the world as soon as practicable on a global and non-discriminatory basis."[323] By 1963, the concern already was mounting in

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321. ITU, Radio Regulations, Resolution No. 36, Geneva (1959).

322. DuCharme, Bowen & Irwin, *supra* n. 271, at 265. Of these allocations, 2800 MHz were for communication satellite services, with 2700 MHz being on a shared basis with terrestrial radio services. Colino, International Cooperation Between Communications Satellite Systems: An Overview of Current Practices and Future Prospects, 5 J. Space L. 65, 69 (1977).

323. U.N.G.A. Resolution 1721, *supra* n. 147.

developing countries that they would be denied the availability of satellite communication because the frequencies available for space communication would be monopolized through application of the first-come, first-served rule. Therefore, attempts were made to establish a new regulatory regime for space services based on world-wide plans.[324] Some developed countries, on the other hand, were concerned that if the usual Notification and Registration rules were not used for space services, or were used on an interim basis while plans were prepared, a sufficient foundation would not be established for proceeding with costly, long-term programs in the space services.[325] Ultimately, the views of the developed nations prevailed.[326] The first-come, first-served regime and its rules regarding Notification and Registration were retained for the space services; a new procedure of Coordination was added

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324. Israel argued that the first-come first-served rule should be abandoned or modified for the space services, and the IFRB proposed that a future Conference be convened to establish world-wide plans for the space services. Leive, supra n. 95, at 211. Algeria, Kuwait and the U.A.R. issued a joint statement calling for world-wide space service plans in order to implement U.N. Resolution 1721. DuCharme, Bowen & Irwin, supra n. 271, at 265. Other countries shared these views.

325. Leive, supra n. 95, at 212.

326. According to one author, the reason the developing countries views were not accepted was because "they could not participate competently or extensively" in the preparations for the Conference, and "did not have large enough delegations to keep pace with the deliberations and developments in the various committees and working groups" at the conference. Jakhu, supra n. 314, at 400-01.

due to the potential problems presented by shared frequency allocations.[327]

The views of the developing countries did find expression in a Recommendation which was based on U.N. Resolution 1721. Recommendation 10A recognized the rights of countries to an "equitable and rational use of frequency bands allocated for space communications" and recommended that use of radio frequencies for space telecommunications "be subject to international agreements based on principles of justice and equity permitting the use and sharing of allocated frequency bands in the mutual interest of all nations."[328] This Recommendation formally introduced the concept of "equitable access." Thus, while the 1963 EARC established the space services in the same regulatory regime as the other services, it initiated the movement toward demands for "equitable access" which ultimately resulted in the scheduling of the Space WARC.

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327. Leive, supra n. 95, at 215.

328. ITU, Final Acts of the Extraordinary Administrative Radio Conference to Allocate Frequency Bands for Space Radiocommunication Purposes, Recommendation 10A, at 219, Geneva (1963).

4.5 The 1965 Plenipotentiary Conference

The 1965 Plenipotentiary Conference, held in Montreux, Switzerland, made no significant changes to the regulatory regime of space services. One result of the Conference is significant for its demonstration of the politics emerging in the ITU which often pitted the developed against the developing nations. This was the reduction in the IFRB from eleven to five members. The developed countries wanted to abolish the Board and place its frequency registration functions within the General Secretariat. They believed its main tasks of establishing the Master Frequency Register and rules for frequency use had been met, and that eleven highly paid experts were not needed merely to manage the Register. The developing countries, however, had come to view the Board, with its impartiality and equitable representation of all regions, as their protector. In a compromise, the Board was retained, but its membership was reduced.[329]

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329. See generally Leive, supra n. 95, at 73-80.

4.6 The 1971 WARC - ST

At the 1971 World Administrative Radio Conference for Space Telecommunications (WARC-ST) certain revisions were made to the Regulations, but the basic scheme embodied by the first-come, first-served rule remained intact. Approximately 177 GHz of the radio frequency spectrum was allocated to space services, mostly on a shared basis with terrestrial services.[330] Additionally, the numerous space telecommunication services we have today were identified in the regulations.[331] Previously, there had been a single service for space telecommunications. The Regulations regarding Coordination and Notification were revised,[332] and the procedure for Advanced Publication was established.[333]

Two important Resolutions were adopted at this Conference. Resolution No. Spa 2-1 was a precursor to Article 33 (2) of the

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330. DuCharme, Bowen & Irwin, *supra* n. 271, at 266.

331. See ITU, *Final Acts of the World Administrative Radio Conference for Space Telecommunications*, Annex 1, Section IIA, at 39-45, Geneva (1971) [hereinafter cited as 1971 Final Acts].

332. *Id*. Annex 8, at 155-182.

333. *Id*. Annex 15, at 219-224.

ITU Convention.[334] It declared for the first time that "the radio frequency spectrum and the geostationary satellite orbit are limited natural resources" which should be used "effectively and economically".[335] Other principles which are central to the issues at the Space WARC were included in this Resolution. First, it stated that all countries have "equal rights" to the use of frequencies and geostationary orbital slots for space telecommunication services.[336] Second, it resolved that states which had registered frequencies with the IFRB for use in space telecommunication services should not receive "any permanent priority . . . [and] should take all practicable measures to realize the possibility of the use of new space systems by other countries . . . ."[337] This was a clear rejection of the first-come, first-served rule. Because it was a Resolution, however, and not a legally binding Regulation, it did not change the legal regime of the geostationary orbit.

The other important Resolution involved the Broadcasting Satellite Service. Resolution Spa 2-2 called upon the Administrative Council to convene World or Regional

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334. 1982 ITU Convention, _supra_ n. 2.

335. 1971 Final Acts, _supra_ n. 331, Res. No. Spa 2-1, at 311.

336. _Id_.

337. _Id_.

Administrative Conferences to plan the frequency bands allocated to this service and its use of the geostationary orbit.[338] This Resolution led to the 1977 WARC-BS.

4.7 The 1973 Plenipotentiary Conference

The results of the 1973 Plenipotentiary Conference held at Malaga-Torremolinos, Spain, demonstrated the increased success developing countries were having in the ITU. The key provisions of WARC-ST Resolution 2-1 were incorporated as Article 33 (2) of the ITU Convention:

> In using frequency bands for space radio services Members shall bear in mind that radio frequencies and the geostationary satellite orbit are limited natural resources, that they must be used efficiently and economically so that countries or groups of countries may have equitable access to both in conformity with the provisions of the Radio Regulations according to their needs and the technical facilities at their disposal. (emphasis added)[339]

The introduction of the concept of "equitable access" into a legally binding treaty was an important step toward the Space WARC.

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338. *Id*. Resolution No. Spa 2-2, at 312.

339. ITU, *International Telecommunications Convention*, Art. 33 (2), T.I.A.S No. 8572 (1973) [hereinafter cited as the 1973 ITU convention].

To provide meaning to the principles of Article 33, the Article 10 responsibilities of the IFRB were expanded to include the geostationary orbit.[340] The new provisions of Articles 10 and 33 gave a new legal status to the geostationary orbit that was on a par with the radio frequency spectrum, and provided a legal basis to the concept of the "orbit/spectrum resource."

In another move designed to promote the "equitable access" provisions of Article 33, the Conference set a schedule of Administrative Conferences for the next six years. The schedule included Conferences to develop plans for the 12 GHz frequency bands which had been allocated by WARC-ST to the fixed, mobile, and broadcast satellite services.[341]

The increased role and success of the developing nations at this Conference was one of its key aspects. Since World War II many newly independent nations had joined the ITU. For the most

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340. The Board was given the additional duties of: (1) effecting a recording of "positions assigned by countries to geostationary satellites" under the same conditions and for the same purpose as they had been doing for frequency assignments; (2) furnishing advice to Members "with a view to the equitable, effective and economical use of the geostationary satellite orbit"; and (3) performing any additional duties concerned "with the utilization of the geostationary satellite orbit . . ." Id. Art. 10.3

341. Mili, Plenipotentiary Conference, A Preliminary Assessment, 41 Telecommunications Journal 2, 5 (1974) (editorial).

part they were developing countries. In an organization where each nation has one vote, and the majority rules, the potential increased power of the developing countries was apparent. This Conference saw the realization of that potential. As noted by the then ITU Secretary General:

> For the first time in the history of the ITU the Conference's work was dominated by problems particular to [developing] countries from the day it opened until the close. These countries brought their full weight to bear on the Conference's work not only because of their numbers but also because of their united viewpoint on most of the basic problems dealt with and the pertinence and quality of the statements of many delegations.[342]

This Conference was only the begining of the increased influence the developing nations would have in the ITU.

4.8 The 1977 WARC-BS

In 1977, the World Administrative Radio Conference for the planning of the Broadcasting Satellite Service (WARC-BS) was held in Geneva. This was the Conference envisioned in Resolution Spa 2-2 of the 1971 WARC.[343] The Conference was

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342. *Id.* at 2.

343. See *supra* n. 338 and accompanying text.

successful in establishing a plan for use of the 12 GHz band by the Broadcast Satellite Service in Regions 1 and 3. Region 2, however, could not reach agreement on a plan and elected to postpone such action until 1983 when a RARC would be convened.[344] The plan for Region 1 and 3, which will be discussed more fully *infra*, alloted frequencies and nominal orbital positions to individual countries.[345] For the first time, a space service abandoned the rule of first-come, first-served.

4.9 The 1979 WARC

The 1979 WARC was the first general WARC since 1959. The Conference was expected to "establish the basic framework for frequency allocations and radio regulations for the development of radiocommunication over the next ten to twenty years."[346]

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344. For a detailed discussion of the positions of key nations, and the events which led to the decision to postpone planning for Region 2, see DuCharme, Irwin & Zeitoun, *Direct Broadcasting by Satellite, the Development of the International Technical and Administrative Regulatory Regime*, IX AASL __ (1984).

345. See *infra* Section 5.1.

346. Kirby, *CCIR and the WARC-79*, 45 Telecommunications Journal 468 (1978).

It was therefore the focus of significant domestic and international attention. Preparations for this Conference began years in advance. The developed countries normally had been well prepared for such Conferences; for this WARC, many developing countries were also well prepared. Regional seminars sponsored by the ITU were held in Africa, Asia and Latin America to help developing countries understand the complex technical reports that would form the basis for Conference decisions.[347] Shortly before the WARC, a large number of developing countries came together during a meeting of the Non-Aligned Movement to discuss their positions for the WARC. They issued a resolution calling for a future conference to plan the use of the geostationary orbit.[348] This was to remain their goal at the WARC.

Due to the advance preparation, the 1979 WARC operated rather effectively in spite of the great number of complicated issues with which it was confronted. The Conference was attended by approximately 2,000 participants from over 142 countries, and by numerous observers.[349] It faced over 14,000 policy proposals; therefore, most work was handled by committees, each

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347. Arnopoulos, The International Politics of the Orbit-Spectrum Issue, VII AASL 215, 228 (1982).

348. Rutkowski, supra n. 275, 23.

349. Arnopoulos, supra n. 347, at 229.

of which had sub-committees with various working groups.[350]

As expected, the WARC reached many important decisions. Technical and operating standards for radio services were revised to reflect new advances in technology, and the Table of Frequency Allocations was expanded from 275 GHz to 400 GHz.[351] This resulted in more than doubling the frequency allocations for the fixed satellite service.[352] In so doing, various frequency bands were modified to reflect the increased use of satellite telecommunication.[353]

All proposals involving the geostationary orbit were examined by an ad hoc working group known as "Six Ad-Hoc Two" which was *formed by Committee Six on Regulatory Procedures*.[354] The proposals relating to equitable access were aptly summarized by

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350. There were nine committees. *Id*.

351. Codding & Rutkowski, *supra* n. 102, at 51. The frequencies from 275-400 GHz, however, have not been allocated. 1982 Radio Regulations, *supra* n. 1, Art. 8, at RR8-183.

352. INTELSAT, *WARC' 79 doubles FSS spectrum*, Vol. 1, No. 6 intellink 1 (First Quarter, 1980).

353. Codding & Rutkowski, *supra* n. 102, at 51. These modifications, however, resulted in more footnotes and reservations than had ever been previously made to the Table of Allocations. McPhail, *Electronic Colonialism. The Future of International Broadcasting and Communication* 165 (1981).

354. Arnopoulos, *supra* n. 347, at 230.

a participant:

> The developing countries generally sought the adoption of resolutions calling for a future planning conference. The developed countries responded with a variety of measures which reaffirmed the right of all countries to equitable access to the orbit, made the coordination process multilateral in nature, provided more ITU assistance, and established a fixed number of years after which a nation's granted rights would extinguish. The underlying essence of these differing approaches are a priori (i.e., granting future rights to each nation on the basis of agreed principles) versus a posteriori (i.e., granting rights on a case-by-case basis as a specific case arises).[355]

After several meetings, the developing nations remained united in their determination for a conference to plan use of the geostationary orbit/spectrum resource. Ultimately, Six Ad-Hoc Two reached a compromise and agreed upon a Resolution which called for a planning conference, but indicated that the conference could consider alternatives other than planning to meet the goal of "equitable access".[356]

The Resolution drafted by Six Ad-Hoc Two was passed by the WARC and incorporated into the Final Acts.[357] Resolution No. 3 noted the limited nature of the orbit/spectrum resource, the growing requirements being made on it, and the need for

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355. Rutkowski, supra n. 275, at 23.

356. Id. at 26. This Resolution is examined, infra Chapter 7.

357. Although originally entitled Resolution BP, it was later designated as Resolution No. 3. See 1982 Radio Regulations, supra n. 1, Resolution No. 3 (copy attached at Appendix B).

"equitable access" to, and "efficient and economical use" of the resource.[358] The Resolution then called for an Administrative Conference "to guarantee in practice for all countries equitable access to the geostationary-satellite orbit and the frequency bands allocated to space services".[359] The Space WARC is a direct result of this Resolution.[360]

In general, the results of this WARC demonstrated not only the increasing dissatisfaction of the developing countries with the current rights vesting mechanism for the orbit/spectrum resource, but also their increasing effectiveness at successfully asserting their positions.

4.10 The 1982 Plenipotentiary Conference

The ITU Plenipotentiary Conference met in Nairobi, Kenya, for six weeks in 1982. Over 1000 delegates from 147 countries

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358. _Id_.

359. _Id_.

360. Two other resolutions of the 1979 WARC concerned the geostationary orbit. Resolution No. 2 repeated and replaced Resolution No. Spa 2-1 of the 1971 WARC-ST. See _supra_ n. 335 and accompanying text. Resolution No. 4 initiated the experimental procedure aimed at limiting the period of validity for an assignment. See _supra_ n. 298 and accompanying text. In addition, Recommendation 700-1 repeated and replaced Recommendation No. Spa 10 of the 1963 EARC. See _supra_ n. 328 and accompanying text.

attended, as well as observers from numerous international and regional organizations.[361] One issue, the attempted expulsion of Israel, demonstrated the increased politicization of the ITU. While this move was narrowly defeated, it occupied a significant amount of Conference time and raised doubts in some countries about the future course of the ITU.[362]

After that issue was settled, the Conference made several significant changes to the Convention. The change with most significance to the Space WARC was the revision of Article 33. According to the 1973 ITU Convention, equitable access to the orbit/spectrum resource was to be available to countries "according to their needs and the technical facilities at their disposal."[363] The revised article deleted the quoted language

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361. ITU, The ITU Plenipotentiary Conference Has Completed its Work, 49 Telecommunications Journal 804 (1982).

362. During this debate the U.S. issued a statement that if Israel were expelled the U.S. would leave the Conference, withhold financial payments and reassess its continued participation in the ITU. Long Range Goals in International Telecommunications and Information, an Outline for United States Policy, Committee on Commerce, Science, and Transportation, U.S. Senate, 98th Cong., 1st Sess. 39 (1983) (report of the National Telecommunications and Information Administration (NTIA)) [hereinafter cited as Long Range Goals]. It should be noted, however, that this was not the first time a country's exclusion from an ITU Conference was sought. Spain was excluded in 1947, as were Rhodesia, South Africa and Portugal in 1973. Congress of the United States, Office of Technology Assessment, Radio Frequency Use and Management, Impacts from the World Administrative Radio Conference of 1979 49 (1982) [hereinafter cited as OTA Report].

363. 1973 ITU Convention, supra n. 339, Art. 33 (2).

and provided instead that equitable access should be determined "taking into account the special needs of the developing countries and the geographical situation of particular countries."[364]

A corresponding addition was made to Article 10 of the 1973 ITU Convention regarding the duties of the IFRB. This addition provided that when furnishing advice to members for their use of the orbit/spectrum resource, the IFRB should take into account "the needs of Members requiring assistance, the specific needs of developing countries, as well as the special geographical situation of particular countries."[365]

The Conference also placed a special emphasis on the improvement of telecommunications infrastructures in developing countries.[366] To this end, a phrase was added to the Convention Preamble recognizing "the growing importance of telecommunication for the preservation of peace and the social

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364. 1982 ITU Convention, supra n. 2, Art. 33 (2). The significance of this change will be addressed infra at Section 7.1.

365. Id. Art. 10.3 (c).

366. Shortly before the Conference, the U.N. General Assembly had passed a Resolution for a "World Communications Year" dedicated to development of communications infrastructure, and recognizing "the fundamental importance of communications infrastructures as an essential element in the economic and social development of all countries." U.N. Doc. A/RES/36/40 (1982).

and economic development of all countries . . ."[367] Additionally, the purposes of the ITU were amended to include the duty to "promote and to offer technical assistance to developing countries in the field of telecommunications . . ."[368] and the duty to "foster international cooperation in the delivery of technical assistance to the developing countries and the creation, development and improvement of telecommunication equipment and networks in developing countries by every means at its disposal, including . . . use of its own resources . . ."[369]

One other change to the Convention also evidenced the increasing politicization of the ITU. Directors of the International Consultative Committees (CCIR and CCITT) had previously been elected by their technical peers at the Plenary Assembly of those bodies.[370] This procedure was changed so that the Directors would be elected in the more political atmosphere of the Plenipotentiary Conferences.[371]

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367. 1982 ITU Convention, _supra_ n. 2, Preamble.

368. _Id_. Art. 4.1 (1).

369. _Id_. Art. 4.2 (c).

370. 1973 ITU Convention, _supra_ n. 339, Art. 11.3 (c)

371. 1982 ITU Convention, _supra_ n. 2, Art. 11.3 (c).

4.11 The 1983 RARC-BS

As agreed during the 1977 WARC-BS, the nations in ITU Region 2 met in 1983 to formulate a Plan for the Broadcasting Satellite Service in the 12 GHz band. Delegations from 25 countries in North, South and Central America and the Caribbean reached agreement on a Plan that allotted frequencies and orbital positions to individual countries and established detailed technical and operating criteria. This Plan is significantly different from the 1977 WARC-BS Plan in that it is much more flexible.[372] A Report of the U.S. Delegation to the Conference indicated it was "classically a technical conference" and "[t]here were no "losers" in the sense that a country, at the conclusion, felt its reasonable needs were not being met."[373]

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372. The key provisions of this Plan are discussed *infra* at Section 5.1.

373. U.S. Dept. of State, *Report of the United States Delegation to the ITU Region 2 Administrative Radio Conference on the Broadcasting Satellite Service*, at 2-3 (1983) [hereinafter cited as U.S. RARC 83 Report].

Chapter 5

PLANNING

The goal of the Space WARC is to guarantee equitable access to the orbit/spectrum resource for all countries.[374] Various methods have been proposed to meet that goal. Most of these methods revolve around planning. The concept of a planned, or engineered spectrum is not new. The U.S. was an early proponent of planning, but was unable to enlist sufficient support for its establishment.[375] In 1970, one author defined the concept of "planning" as follows:

> Under these plans, specific requirements for frequency bandwidths of ITU members or of specific geographic areas are internationally recognized. These agreed-upon requirements are matched with specific frequencies or bandwidths and technical and operating conditions are specified. In essence, ITU members through such plans agree in detail on how a scarce resource shall be apportioned and used by countries competing for frequencies. In this sense, the affected portion of the spectrum can be said to be "engineered" or "planned". (emphasis added)[376]

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374. See <u>infra</u> n. 545 and accompanying text.

375. See <u>supra</u> Section 4.2.

376. Leive, <u>supra</u> n. 95, at 56.

The current concept of planning is very similar; however, orbital positions are included when space services are involved. This type of planning, where frequencies and orbital positions are allotted to countries, is known as *a priori* planning. The evolutionary approach embodied in the first-come, first-served rule, is known as *a posteriori* planning.

This chapter outlines the current *a priori* plans which exist for space services.[377] It then reviews various proposed methods which have been developed by the CCIR as part of their Space WARC preparations. Other proposals for ensuring equitable access are also surveyed. Finally, this chapter summarizes the views of the developed and developing countries towards planning.

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377. Several Plans also exist for non-space services: Coast Radiotelephone Stations (Appendix 25); Aeronautical Mobile Service (Appendix 26 & 27); and Maritime Mobile Service (Appendix 31). 1982 Radio Regulations, *supra* n. 1. A plan for the High Frequency service is being developed. The first session identified the major features of the Plan, and the second session will develop the full Plan. Montgomery, *Preliminary Views on the 1985 Space Conference*, at 3, paper presented at IIC 1984 Annual Conference, Berlin (Sept. 21-23, 1984). In addition, planning mechanisms exist at the regional level. See Codding & Rutkowski, *supra* n. 102, at 275 n. 84. For a discussion of early regional plans, see Jakhu, *supra* n. 314, at 389-91.

5.1 The Planning of the Broadcasting Satellite Service.

In 1977, for the first time, a space service was planned. The 1977 WARC-BS devised a plan for the Broadcasting Satellite Service (BSS) in ITU Regions 2 and 3. This service, also known as "direct broadcasting service" (DBS), is reserved for satellite systems designed primarily to transmit programs directly to homes for reception by small, inexpensive dish antennas.[378] Although there were no operational DBS systems in 1977, many nations were planning to establish them in the future, and issues regarding DBS, both technical and political, had been the subject of international discussion for many years.[379]

The adopted BSS Plan allotted geostationary orbital positions, frequencies, and service areas on a country-by-

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378. The official definition of the BSS s "a radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public." 1982 Radio Regulations, supra n. 1, Art. 1, No. 37.

379. See Christol, supra n. 149, at 605-720.

country basis.[380] Numerous factors were considered in the allotment process including country size, service areas, time zones, and language differences.[381] The Plan is extremely detailed and covers virtually all satellite characteristics which may affect transmission.[382] The Plan was designed to meet BSS requirements for the countries in Regions 1 and 3 for a period of 15 years.[383]

The orbital arc included in the Plan is between 37 degrees West and 170 degrees East. In that arc, 34 orbital positions were designated, each separated by 6 degrees of arc. Many orbital positions were assigned more than once for use by geographically separated service areas, thus permitting frequency reuse. The frequencies included in the Plan are in the 12 GHz band. Only the downlink was planned. Most countries received frequencies for four or five television

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380. See ITU, Final Acts of the World Administrative Radio Conference for the Planning of the Broadcasting-Satellite Service in Frequency Bands 11.7 - 12.2 GHz (in Regions 2 and 3) and 11.7 - 12.5 GHz (in Region 1), Geneva (1977); now incorporated as Appendix 30, 1982 Radio Regulations, supra n. 1.

381. Jakhu, supra n. 86, at 359.

382. Specific areas of the Plan include: nominal orbital position; frequencies; antenna boresight geographical coordinates; antenna beamwidth; orientation of the ellipse; polarization; and effective power. 1982 Radio Regulations, supra n. 1, Appendix 30, Art. 11.

383. This Plan will remain in force, however, until revised by a Conference. Id. Art. 16.

channels, but large countries with greater demand received more.[384] When a station is brought into service, the country must notify the IFRB for the purpose of recording in the Master Register. All assignments made in accordance with the Plan, however, have the same status regardless of the date they are recorded.[385]

All countries in Regions 1 and 3 undertook to operate only in accordance with the Plan. No variations were permitted, even on a non-interference basis. Although a procedure for Plan modification was established, any modification requires approval of all administrations potentially affected by the proposal.[386] The inflexibility of this Plan has been its main criticism. Other than formal modification, no provision was made for the use of new technologies which might make certain areas of the Plan obsolete. Nevertheless, this first Plan for the space services was significant.[387]

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384. For example, the USSR received 65 channels, and Australia 36. _Id_. Art. 11.

385. _Id_. Art. 5.2.2.

386. _Id_. Art. 4.

387. Many saw it as "a successful exercise in the equitable international distribution of one segment of the orbit-spectrum resource." Weiss, _Planning in the Fixed-Satellite Service_ 2, paper presented at the IEEE Antennas and Propagation Symposium, Seattle (June, 1979).

At the 1983 RARC-BS, the countries of Region 2 also succeeded in agreeing on a Plan for the BSS in the 12 GHz band. The ability to devise this Plan was greatly aided by the technological advances that had occurred since the 1977 WARC-BS and by extensive use of computer modeling techniques used to test various proposals.[388] The Plan allotted 48 geostationary orbital positions and 2114 television channels among the individual countries. It also established technical operating parameters and regulatory procedures. This Plan is significantly different from the Plan for Regions 1 and 3 in two important aspects. For the first time, uplinks were planned in addition to downlinks.[389] Second, in contrast to the rigidity of the 1977 Plan, the 1983 Plan is characterized by flexibility.

A procedure for Plan modification, similar to that used in the 1977 Plan was incorporated in the 1983 Plan.[390] In addition to formal modification, however, three areas of flexibility were built into the Plan. First, a system which varies from the

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388. U.S. RARC Report, _supra_ n. 373, at 3.

389. Uplinks were planned in the 17 GHz band. _Id_. at 46.

390. ITU, _Final Acts of the Regional Administrative Radio Conference for the Planning of the Broadcasting-Satellite Service in Region 2_, Art. 4, Geneva (1983) [hereinafter cited as Final Acts Region 2]. See also DuCharme, Irwin & Zeitoun, _supra_ n. 344.

characteristics specified in the Plan, but will not adversely affect other administrations, may be established.[391] Second, a system which differs from the Plan may be established on an "interim basis", even though it may adversely affect the assignment of other administrations.[392] Although agreement of the other administrations is required if increased interference could result, the procedure is simpler than that required for permanent Plan modification.[393] Finally, some flexibility in orbital location was allowed. An administration which shares an orbital location may place its satellite anywhere within a 0.4 degree arc centered on the nominal orbital location.[394]

The flexibility of this Plan was not brought about without difficulty. The procedure for interim systems was especially difficult to secure because several Latin American countries

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391. Final Acts Region 2, *supra* n. 390, Arts. 3.2 & 5.2.2A. These systems would typically be low-power operations. *Report of the Canadian Delegation to the Regional Broadcasting-Satellite Conference (Region 2) Geneva, June 13-July 15, 1983*, at 54-55 [hereinafter cited as Canada Region 2 Report].

392. An interim system can operate for 12 years, with provision for a 2 year extension. Final Acts Region 2, *supra* n. 390, Art. 3.2 & Resolution Com. 6/5.

393. See U.S. RARC Report, *supra* n. 373, at 47.

394. Final Acts Region 2, *supra* n. 390, Art 3.3. Agreement of the other administrations which share the orbital location is necessary. *Id*.

were suspicious of the motives of its proponents.[395] Ultimately, however, flexibility was established. The developing nations received their guaranteed access, and the developed countries were satisfied that their reasonable needs were met and that the Plan contained a sufficient degree of flexibility. This Plan, therefore, demonstrated one important fact - an _a priori_ Plan can be designed which is flexible and allows for advances in technology. It must be emphasized, however, that there are many differences between the planning which occurred for the BSS and planning issues the Space WARC will face; a much more difficult road is ahead.[396] Therefore, although the success of the 1983 BSS Plan bodes well for the Space WARC, its relevance should not be overestimated.

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395. Canada Region 2 Report, _supra_ n. 391, at 11.

396. The 1983 RARC only had one service to plan. The Space WARC could invlove many. Even if the WARC focuses on the FSS, as anticipated, the FSS is a much more complex service than the BSS. It handles various types of data for different end users. Different bands with varying technologies are involved. Moreover, when the BSS was planned, no operational systems existed.

5.2 CCIR Proposals

The CCIR was invited by the 1979 WARC to prepare a report on the planning of space services.[397] Pursuant to that request, the CCIR identified five potential methods of planning. Two additional methods were added as a result of proposals made at the CCIR preparatory meeting for the Space WARC. These seven methods are illustrative of the wide range of plans which the Space WARC could adopt.

Methods 1, 2 and 3 are _a priori_ planning schemes with varying degrees of flexibility. Method 1 is a detailed Long-Term (10-20 years) _a priori_ allotment Plan. It is described by the CCIR as:

> A long-term world or regional a priori frequency allotment plan with a procedure for the revision of requirements that is similar to Article 4 of Appendix 30 (the 1977 Broadcasting Satellite Plan). Under this procedure new requirements may be accommodated only if they do not cause unacceptable interference to those networks within the Plan.[398]

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397. See CCIR Space WARC Report, _supra_ n. 133.

398. _Id_. at 99.

Method 2 is a shorter term (3-5 years) allotment Plan. Pursuant to this Plan

> [c]onferences would be convened periodically (3-5 years) to revise the technical parameters and regulatory procedures for the plan and to accommodate new requirements. At each conference it is understood that all of the existing networks and all of the new or modified requirements would be accommodated. During the interval between conferences, new requirements would be accommodated to the extent that they did not cause unacceptable interference to networks in the plan.[399]

Method 3 is an allotment Plan with guaranteed access. Pursuant to this Plan,

> [c]onferences would be convened from time to time as required (at intervals of 10 years or less) to revise the overall technical parameters and regulatory procedures. At these conferences, all existing networks and new requirements would be accommodated in the plan. Between conferences, there would be guaranteed access for new requirements. Access would be guaranteed by such mechanisms as reserving spectrum/orbit capacity for future requirements unforeseen at the time of the conference or by the subsequent convening of a special meeting.[400]

The main difference between this Method and Methods 1 and 2, other than the duration of the Plan, is the provision for guaranteed access for a newly identified requirement. Thus, if a country had underestimated their needs at the Planning Conference, they could still be accommodated.

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399. Id. at 100.

400. Id.

Although methods 1 - 3 do not specify that each country would receive allotments, that has been the practice with previous *a priori* plans. Moreover, during the process of *a priori* planning it has never been a practice to question a country's stated requirements. Thus, countries may receive allotments even though they have no objective need for them.

In contrast to *a priori* plans, method 4 is basically a procedure for guaranteed access through multilateral coordination. Under this method,

> [t]he conference would not establish a formal plan, but would establish procedures for guaranteed frequency/orbit access for new requirements. Normally, frequency/orbit access would be coordinated in accordance with the procedures contained in Method 5. When a new requirement could not readily be accommodated a special meeting would be called of those administrations which might be affected and a means would be found to accommodate the new requirement.[401]

Method 5 entails minor revisions to the current first-come, first-served bilateral coordination procedure. It is described as

> a phased revision of the existing regulatory procedures, regulations and CCIR Recommendations as well as the development of new procedures, regulations and Recommendations (simplified to the

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401. *Id.* at 101. This method is very similar to a procedure proposed by Canada at the 1979 WARC. DuCharme, Bowen & Irwin, *supra* n. 271, at 273, 277-78.

extent possible) leading to more efficient use of the geostationary satellite orbit/spectrum resource.[402]

As can be seen, these proposals run the gamut from a situation very close to that which currently exists (method 5), to a rigid, long-term plan similar to the 1977 BSS Plan (method 1). The CCIR report analyzes these different approaches based on economic, technical and access criteria.[403]

Methods 6 and 7 were added by the CCIR at the July 1984 Conference Preparatory Meeting (CPM) for the Space WARC. Method 6 is based on a proposal by the USSR and Method 7 is based on a Chinese proposal. Both are _a priori_ plans with a duration of about ten years.

Method 6 would provide considerable flexibility. Requirements submitted by administrations to planning conferences could be in a more general form that would allow for certain changes in system design during the implementation phase.[404] These changes could be a result of changes in requirements, or technological advances. For accommodation of

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402. CCIR Space WARC Report, _supra_ n. 133, at 102.

403. _Id_. See also Vicas, _An Economic Assessment of CCIR's Five Methods for Assuring Guaranteed Access to the Orbit-Spectrum Resource_, VII AASL 431 (1982).

404. Requirements submitted by administrations would have to include: satellite location, beam coverage, frequency/ polarization used, and certain other general parameters. See CCIR Preparatory Meeting ORB-85, Joint Meeting, Doc. B/167-E (July 16, 1984).

requirements which were unforeseen at the planning conference, a modification procedure would be established.[405]

Method 7 is notable for its optimization process. Requirements submitted by administrations would be the starting point for this process. Where stated requirements could not be fully accommodated, a step-by-step process would be carried out through multilateral coordination between the concerned administrations. Computer programs based on established criteria would be employed during the optimization process.[406]

5.3 Other Proposals

Many other methods for ensuring equitable access to the orbit/spectrum resource have been proposed. Most are similar to one of the seven CCIR methods.[407] Several unique concepts,

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405. *Id.*

406. *Id.* Doc. B/168 (Rev. 1)-E (July 19, 1984).

407. Eleven methods, including the five CCIR methods, are discussed in, Second Notice of Inquiry, *supra* n. 79, at Appendix E. Rothblatt advocates expanding the role of the CCIR to give that body responsibility for ensuring access to the orbit/spectrum resource. Rothblatt, *Rapid Evolution in Satellite Network Facilities - Legal Implications and the 1985 Space WARC*, Legal Symposium, World Telecommunication Forum 1983, at II.6.1, Geneva (1983).

however, have been offered. One group of proposals focuses on an increased role for common user organizations such as INTELSAT and ARABSAT. A planning and coordination system in the ITU which would grant priority to needs of common user organizations has been proposed.[408] Establishment of regional consortia to provide domestic satellite service has also been suggested.[409] A similar proposal calls for the U.S. and other developed countries to form joint ventures with groups of developing countries to provide their domestic services.[410] The focus of these methods is on an increased role by common user organizations in an attempt to provide the actual needs of many developing countries for telecommunication service.[411]

Another group of proposals assert that a market system would be the most effective and efficient method of managing the

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408. Dizard, supra n. 154.

409. Levin, Orbit and spectrum resource strategies. Third World Demands, Telecommunications Policy 102 (June 1981). The organizations would be formed in areas of the world with a large number of developing countries. South America, Africa, the South Pacific and Asia would be prime candidates. The regional organization would provide domestic broadcast and thin-route service. These organizations could be established in several different ways and would not necessarily be a substitute for a planning approach. They could, for example, jointly sell or trade a portion of their planned orbit/spectrum resource for a satellite system. The Plan would have to be designed to allow such actions. Id.

410. OTA Report, supra n. 362, at 121-23.

411. See also Rothblatt, ITU Regulation of Satellite Communication, 18 Stanford J. Int'l L. 1, 22 (1982).

orbit/spectrum resource.[412] In general, such proposals would divide the orbit/spectrum resource among nations, and permit those nations to sell or lease their rights. It has been argued that a market system would "provide incentives to owners of those rights to use them economically."[413] One proposal suggests the creation of an "international condominium" to auction the electromagnetic spectrum and orbital slots and distribute the resulting revenues.[414]

Another group of proposals focuses on the creation of a specific legal regime for the geostationary orbit. The regime could be under the direction of the ITU or the UN. Part of the regime might involve a tax or levy for access to the orbit/spectrum resource.[415]

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412. Meckling, Management of the Frequency Spectrum, Wash. U. L. Q. 26 (1968); Wihlborg & Wijkman, Outer Space Resources in Efficient and Equitable Use: New Frontiers for Old Principles XXIV The Journal of Law and Economics 23 (1981).

413. Meckling, supra n. 412, at 32.

414. Wihlborg & Wijkman, supra n. 412, at 37; Arnopoulos, supra n. 347, at 234; see also Rutkowski, The 1979 World Administrative Radio Conference: The ITU in a Changing World, 13 (2) International Lawyer 289, 308 (1979). Proposals to establish a market system have been criticized on a technological basis. They could only follow the creation of a Plan which made the original allocations. Such allocations would have to be detailed and particularized. Their transfer in whole or part, it is asserted, would be impractical. An allocation designed for Chile, for example, would be little benefit to Canada.

415. UNISPACE 82, supra n. 27, at 125; Arnopoulos, supra n. 347, at 234-35.

5.4 The Opposing Views of Planning

In general, two opposing views on planning can be discerned. Most developed nations favor the current regulatory regime. They believe technology and engineering practices will advance sufficiently to accommodate needs as they arise. Most developing nations, on the other hand, favor a detailed *a priori* plan which will provide them with a present guarantee to future access to the orbit/spectrum resource.

The views of the developing countries have been detailed in prior sections. The prologue to the Space WARC is a chronicle of the gathering strength of developing countries. From Recommendation 10A in 1963[416] to Resolution 3 in 1979,[417] the objective has been a Plan guaranteeing access. It is unlikely that objective will change prior to the Space WARC. Their desire for a planning approach has been shaped by a number of factors.

The events leading to the Space WARC did not occur in a vacuum. They are part of an overall effort by developing

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416. See *supra* n. 328 and accompanying text.

417. See *supra* n. 357 and accompanying text.

countries to secure a New International Economic Order (NIEO), and a New International Communications Order (NICO).[418] Another factor which has guided the developing nations to their objective of planning has been a distrust of technical approaches. It has been asserted that it is "fear of technology and the lack of technically trained people to deal with the issues involved that drive [developing countries] to political fora and to seek political solutions even in technical fora."[419] The distrust of technology is also shaped by a belief that technological solutions which may be perfectly satisfactory for developed nations, may be economically prohibitive for developing countries.[420] Finally, another *factor leading developing nations to a planning* approach has

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418. See generally, Arnopoulos, supra n. 347, at 218-20; and Christol, International Space Law and the Less Developed Countries, 19 Colloquium 243 (1976). Developing countries have led efforts to secure new regimes for other "international" resources. Pursuant to the new Law of the Sea Treaty, developing nations could secure benefits from mining of the deep-sea bed. See U.N. Doc. A/CONF.62/122, Oct. 7, 1982 (not effective). The Moon Treaty also contains provisions for an international regime to distribute benefits from mining of the Moon. "Agreement Governing the Activities of States on the Moon and Other Celestial Bodies", U.N. Doc. A/RES/34/68, Dec. 14, 1979, 18 ILM 1434 (not effective), [hereinafter cited as Moon Treaty]. The concept of the Common Heritage of Mankind, which will be discussed infra Section 6.2.3, underlies many of these efforts by the developing countries.

419. Jasentuliyana, Space Telecommunications - Issues and Policies: Role of the United Nations, XXVI Colloquium 59, 61-62 (1983).

420. Srirangan, supra n. 38, at 3-4.

been the lack of effort by developed nations to establish other types of arrangements which could alleviate their concerns.[421] The developing countries did not get the attention of the developed nations until they had the power to schedule a planning conference.

Although this thesis has focused on the developing countries as a block, a further distinction is important. There are two groups within the developing countries with separate interests. One group includes the developing countries which either have telecommunication satellites, or plan to have them reasonably soon. This group includes India, Indonesia, and Brazil. These countries have developed a level of technical expertise in this area, and have been the leaders of the developing countries within the ITU. The second group of countries includes the vast majority of developing nations which, because of their small population or geographic area, will not have a requirement for a satellite system of their own

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421. Rutkowski, of the U.S. FCC, aptly makes this point:

> [T]he developed countries have not been very active in devising new kinds of a posteriori arrangements which are responsive to the concerns of the new ITU members. The firstcomer would not be favored even within most domestic systems of government. For example, patent rights and copyrights are granted only for limited periods of time; in the United States, the rights granted by the FCC to broadcast stations are limited in time . . . Rutkowski, supra n. 414, at 307.

in the foreseeable future.[422]

The political motivations of these two groups are very different. The first group sees a real need to secure access to their orbit/spectrum requirements. They also may see themselves evolving into regional satellite powers, with their satellites being leased by other developing countries.[423] The other group of developing countries back the first group for two primary reasons. One is a desire to receive something for nothing.[424] The other, more important reason, is their general perception that the first-come, first-served regime is inequitable and should be eliminated.[425] Regardless, until

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422. Dizard estimates that "no more than 10 percent of the Union's members have, or can reasonably be expected to have in the foreseeable future, need for direct access to GSO or frequency resources." See Dizard, _supra_ n. 154, at 14.

423. _Id_. at 27; and Levy, _supra_ n. 154, at 200-01 ("the true motivation of . . . second tier satellite operating states . . . [is] to establish their hegemony over regional telecommunications.").

424. As Dizard stated, "it has the appeal of a free lunch." Dizard, _supra_ n. 154, at 28. See also Stone, _The Legal and Political Considerations of the 1985 World Administrative Radio Conference_, 11 J. Space L. 61 (1983). But one may wonder just what it is these nations believe they will receive since they have no reasonable expectation of using any allotment in the foreseeable future. Some may be counting on an eventual marketplace approach where they could sell or lease their allotments. Others may see political benefits they could reap from having a share of the orbit/spectrum resource.

425. "For most ITU members, "first-come, first-served" is simply not an equitable rights vesting mechanism." Rothblatt, _supra_ n. 411, at 15.

there is a reason for them not to seek an orbit/spectrum allotment of their own, they can be expected to support the first group in its quest for guaranteed access. Nevertheless, because their need is for a functioning domestic satellite system, and not only guaranteed access to a resource they may never use, at the Space WARC an approach which addresses that need could have appeal to this second group of developing countries.

The developed countries, in general, have resisted a planning approach. The U.S., Canada, Europe, and the USSR all oppose long-term assignment plans.[426] The key reasons cited against planning for space services have always been the negative effect plans could have on technological advancement, and the potential that many allotments in a plan would go unused and waste the orbit/spectrum resource. Concern for unhampered technological advancement is well placed. Great strides have been made by developed countries in space and telecommunications science. These advances have been costly. Moreover, they have resulted in direct benefits to all countries, including the developing nations. Certainly the low-cost service many developing countries now receive from INTELSAT would not have been possible had it not been for the efforts and investments made by the developed countries. It is

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426. Dizard, supra n. 154, at 31-33.

important to continue that investment in new technology.

Many have argued that planning would hinder the development of technology because a plan must be based on current, or at best near-term future technology.[427] The impact of a plan on new technology would hinge on three main factors: (1) the frequencies planned; (2) the plan flexibility; and (3) the plan duration.

The frequencies encompassed by a plan is one of its most important aspects. Certain areas of the spectrum have been in use for a significant period of time and the technology is well-developed. In general, this can be said of the spectrum below 15 GHz.[428] Therefore, planning of that area of the spectrum would have less affect on technological advancement than if higher frequencies were planned.

Plan flexibility is the next important factor. The contrast between the 1977 and the 1983 BSS Plans demonstrate the benefit of flexibility. Under the 1977 Plan, any proposed changes must go through a cumbersome and unsure modification procedure.[429] Numerous administrations could delay or bar implementation of

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427. See Weiss, Planning in the FSS, supra n. 387; Rothblatt, supra n. 411.

428. See supra n. 78 and accompanying text.

429. See supra n. 386 and accompanying text.

new technologies. Under the 1983 Plan, however, it is much easier to take advantage of new technologies. Operations on a non-interference, or interim basis, are possible without modifying the Plan.[430] The need for flexibility was recognized by the UNISPACE 1982 Conference which concluded that "[t]he planning method and/or arrangements developed by [the] ITU should be flexible enough to permit the introduction of new types of systems . . ."[431]

Finally, the duration of the plan could be critical to the impact the plan would have on technological advancement. While technology may advance rapidly, it advances over a period of years, not months. Therefore, a short-term plan would affect technology much less than a plan covering 15 - 20 years.

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430. See <u>supra</u> n. 390-394.

431. UNISPACE 82, <u>supra</u> n. 27, at 71.

Two new types of systems that will require flexibility are multi-mission satellites and space platforms. Rigid plans could prevent operation of such systems. For example, a multi-mission satellite providing BSS and FSS service in the C, Ku and Ka bands should be feasible in the near future. Location of that satellite is limited to certain positions by the BSS Plans (assuming operation at 12 GHz). If another plan prevents use of the C, Ku, or Ka band from those positions for FSS operation, the full potential of the satellite could not be realized. The more plans, the more constraints. This issue should be of concern to developing countries because multi-mission satellites are particularly attractive for small countries requiring several space services, but having limited capacity requirements in any particular service. CCIR Preparatory Meeting ORB-85, Doc. B/155 (Rev. 1)-E, at 6 (1984).

The other primary concern of the developed countries has been that a plan could result in waste of the spectrum by states that did not use their allotments. As discussed earlier, many states simply have no foreseeable need for a nationally owned domestic satellite system. If such states are allotted just one orbital/frequency slot each, that would constitute a waste and lead to less efficient use of the orbit/spectrum resource.[432] To preclude such waste, a plan could include criteria and a procedure to objectively evaluate requirements submitted by administrations; only "requirements" which met the criteria would be included in the plan. Such a procedure, however, may be politically untenable.[433] If an objective procedure cannot be established, a short-term plan would be more likely to result in an accurate projection of needs than

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432. A difficult issue for any plan would be how to allocate useable portions of the planned frequencies. Many countries have such a small population that they will never require the capacity of an entire satellite. If they are allotted sufficient bandwidth for an entire satellite, a great waste of the orbit/spectrum resource could result. If they are allotted a small portion of the frequency band along with an orbital slot, however, it is unlikely their allotment could ever be used. A satellite must have sufficient bandwidth to handle thousands of circuits. Otherwise the large expenses of development, purchase, launching etc. could not be recovered.

433. This has not been the practice with plans in the past. Requirements have always been accepted by other states. Perhaps this is because states are concerned that if they question the requirements of other countries, their own requirements may be questioned. Moreover, any procedure to scrutinize requirements would be an infringement on traditional state sovereignty, and it is unlikely either developing or developed nations would favor such a situation.

would a long-term plan. Additionally, a flexible plan could provide for use of a vacant allotment on an interim basis.

In general, the primary objections to a planning approach are directed at particular types of plans, i.e. long-term, rigid plans which allot resources to all countries irrespective of need. Those objections could be overcome, or at least minimized by the adoption of an appropriately designed plan. It would appear that developed nations are now moving away from a total rejection of planning to an acceptance of a certain type of plan. A U.S. report acknowledged that:

> As far as the [U.S.] is concerned, certain types of a priori allotment plans would not be as objectionable as others. Plans based on sound engineering and operational parameters might be workable internationally, at least on a regional basis. Indeed, U.S. domestic satellite operations are based on an a priori approach.[434]

That same report found "[t]here may even be some benefits to the [U.S.] from adopting an a priori allotment plan."[435] Thus, while the developed countries remain generally opposed to planning, there is growing acceptance of the fact that some form of planning may be a political necessity, and that certain types of plans may be feasible and beneficial. In this respect it appears the developed countries have moderated their views.

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434. OTA Report, supra n. 362, at 19.

435. Id. at 20.

A similar trend is discernable in the developing countries. Mr. T.V. Srirangan, the Indian delegate to the 1979 WARC who authored Resolution 3, is a recognized leader on telecommunication matters within the developing countries. In a recent article he made several points regarding the upcoming Space WARC. He indicated that the fixed satellite service was where the problems existed, and that "in examining the various planning and other approaches, essentially the needs of [the] FSS would predominate."[436] He found the major problem of orbit congestion in the FSS was in the C band and "to an extent" in the Ku band.[437] Moreover, following an examination of possible planning approaches, he concluded that an intermediate-term plan had the best potential to ensure equitable access without too adversely affecting technological advancement and other relevant concerns.[438]

The opinions espoused by Mr. Srirangan are not very far from recent statements made within the U.S. FCC. That organization also expects the focus of the Space WARC will be on the FSS,[439] and accepts that the C band and "perhaps" the Ku band "may be

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436. Srirangan, _supra_ n. 38, at 8.

437. _Id_. at 6.

438. _Id_. at 11.

439. Fourth Notice of Inquiry, _supra_ n. 35, at 4.

440. _Id_. at 9.

appropriate for the consideration of alternative ITU arrangements."[440] Thus, it appears the main area of contention at the Space WARC will be the form of alternative arrangements for the FSS in the C and possibly Ku bands. Although this may narrow the issues somewhat, one should still expect significant debate on what alternative arrangements are appropriate.

Chapter 6

SPACE LAW AND ITS APPLICATION TO THE GEOSTATIONARY ORBIT

This Chapter examines the legal status of the geostationary orbit and fundamental principles of space law. It then applies those principles to use of the geostationary orbit by telecommunication satellites under current and proposed regulatory regimes.

6.1 The Legal Status of the Geostationary Orbit

The applicability of international space law to the geostationary orbit depends on whether the orbit is in outer space. There is no universally accepted definition of outer space.[441] It is generally accepted, however, that objects which orbit the earth are located in space, and there is growing acceptance of the proposition that beyond the altitude of 100 Km above sea level, the boundary of space has been reached.[442] Therefore, the geostationary orbit should be considered part of outer space; however, one challenge to this proposition has been asserted.

In 1976, a group of eight equatorial states meeting in Bogota asserted sovereignty over areas of the geostationary orbit. They declared

> that the geostationary synchronous orbit is a physical fact linked to the reality of our planet because its existence depends _exclusively_ on its relation to gravitational phenomena generated by the

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441. Many views on the boundary between air space and outer space have been asserted. See Cheng, _The Legal Regime of Airspace and Outer Space: The Boundary Problem. Functionalism versus Spatialism: The Major Premises_, V AASL 323 (1980); Qizhi, _The Problem of Definition and Delimitation of Outer Space_, 10 J. Space L. 157 (1982); Christol, _supra_ n. 149, at 502-511.

As early as 1959 the U.N. recognized the issue of the definition/delimitation of outer space as one requiring attention. Additionally, it h been on the agenda of COPUOS since 1967. Christol, _supra_ n. '9, at 439. Nevertheless, no definition has been agreed upon.

442 Christol, _supra_ n. 149, at 505; and Gorove, _The Geostationary Orbit: Issues of Law and Policy_, 73 Am J Int'l L. 444, 447 (1979)

earth, and that is why it must not be considered part of the outer space.[443] (emphasis added)

The equatorial states have not received support from other countries. Most nations viewed the Declaration as a political act directed against the developed countries who were using the geostationary orbit.[444]

The factual basis[445] and the legal basis for the

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443. Declaration of the First Meeting of Equatorial Countries, signed in Bogota, December 3, 1976, by Brazil, Columbia, Congo, Ecuador, Indonesia, Kenya, Uganda and Zaire [hereinafter cited as the Bogota Declaration]. The Declaration is reprinted in Manual on Space Law, supra n. 228, Vol. II, at 383 et seq.

444. See Canada Region 2 Report, supra n. 391, at 13.

445. The Declaration asserts that the existence of the geostationary orbit is due exclusively to the earth's gravity and for that reason it is not a part of outer space. Factually, that proposition is incorrect. It is well established that numerous forces act upon an object in the geostationary orbit, only one of which is the force of the earth's gravity. See supra n. 4.

446. The Outer Space Treaty establishes that outer space is not subject to national appropriation by claim of sovereignty or otherwise. See "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies", Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 206 (effective Oct. 10, 1967) [hereinafter cited as OST]. Since the geostationary orbit is factually a part of outer space it is subject to the same legal regime and is not legally subject to appropriation. Jakhu also points out that "[a]ll satellites (both in the geostationary and non-geostationary orbits) use the radio frequencies allocated to the space services in the Radio Regulations. This implies that member States of the ITU (including the Bogota Declaration States) recognize and accept that all satellites are in outer space, and consequently the geostationary satellite orbit is in outer space." Jakhu, The Legal Status of the Geostationary Orbit, VII AASL 331, 340.

Declaration[446] have been attacked. The UNISPACE 1982 Report acknowledged that most nations consider the geostationary orbit a part of outer space.[447] In any event, the equatorial countries have not forcefully asserted their position at recent international conferences. In fact, some appear to be moderating, and possibly abandoning their earlier position.[448] Although this issue will probably be raised by the equatorial countries at the Space WARC, it will receive little support, if any, and should not require significant Conference time.[449]

Because it is generally accepted that the geostationary orbit is located in outer space, the fundamental principles of space law apply to the orbit.

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447. UNISPACE 82, _supra_ n. 27, at 70.

448. See Jakhu, _supra_ n. 446, at 342-44.

449. At the 1983 RARC, Columbia and Ecuador asserted their claim for the record, but it was "generally ignored by the other participants" and took only a few minutes of the Conference's time. U.S. RARC Report, _supra_ n. 373, at 51.

The official ITU position has been that this issue is a matter for COPUOS. DuCharme, Bowen & Irwin, _supra_ n. 271, at 272.

6.2 Fundamental Principles of Space Law

A number of principles have been recognized as fundamental principles of space law.[450] Three of these have particular relevance to the geostationary orbit and the issues that will be addressed at the Space WARC. These three principles are included in the Outer Space Treaty and are also recognized as general principles of international law which are binding on all states.[451] They are: (1) the principle of freedom of use of outer space; (2) the non-appropriation principle; and (3) the common interest principle.

6.2.1 Freedom of Use of Outer Space

The 1967 Outer Space Treaty, in its first article, declares that "Outer Space . . . shall be free for exploration and use

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450. See Space Activities and Emerging International Law, at Chapter V (Matte ed. 1984) [hereinafter cited as Emerging Principles].

451. See Jakhu, The Principle of Non-Appropriation of Outer Space and the Geostationary Orbit, XXVI Colloquium 21, 22 (1983); Christol, The Jus Cogens Principle and International Space Law, XXVI Colloquium 1 (1983); and Vlasic, The Space Treaty: A Preliminary Evaluation, 55 Columbia L. Rev. 507 (1967).

by all States without discrimination of any kind, on a basis of equality and in accordance with international law . . .[452] The terms "exploration and use" were not defined in the Treaty.[453] Nevertheless, although the activity of placing a satellite in the geostationary orbit for telecommunication may not be "exploration", it constitutes "use".[454]

The Outer Space Treaty places a number of limitations on the *freedom of use doctrine. Article I indicates two of those* limitations. Use must be "without discrimination of any kind, and on a basis of equality . . ."[455] Use must also be "in

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452. OST, supra n. 446, Art. 1.

This was not the first occasion this principle was asserted. In 1961 the U.N. General Assembly stated that outer space was "free for exploration and use by all states . . ." U.N.G.A. Resolution 1721, supra n. 147. In 1963, in Resolution 1962, the U.N. General Assembly again declared outer space was "free for exploration and use by all states . . ." U.N.G.A. Resolution 1962 (XVIII) "Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space", (Dec. 13, 1963). This Resolution was a precursor to the Outer Space Treaty of 1967. All nine principles *declared in this Resolution were incorporated in* that Treaty. For a more detailed discussion of the historical development of this principle and the other fundamental principles discussed in this Section see Emerging Principles supra n. 450; and Christol, supra n. 149.

453. There has been some discussion in the literature regarding the distinctions between exploration and use. See Emerging Principles supra n. 450, at 269-74.

454. Id. at 273; and Christol, supra n. 149, at 39-42.

455. OST, supra n. 446, Art 1. Legal, and not factual equality is the objective of this provision. See infra n. 521.

accordance with international law . . ."[456]

Limitations on freedom of use also appear in other articles of the Treaty. Two primary limitations are the two other fundamental principles of space law -- the non-appropriation, and the common interests provisions. These will be discussed _infra_. Another important limitation is found in Article IX, which provides that in the use of outer space, states "shall conduct all their activities . . . with due regard to the corresponding interests of all other States . . ."[457] Additionally, states must bear responsibility and liability for their use of outer space,[458] and have certain limited duties of consultation, observation and information.[459] One specific activity was absolutely prohibited. States undertook "not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction."[460]

The principle of freedom of use is also subject to limitation by other international agreements. Such limits are found in

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456. OST, _supra_ n. 446, Art. 1. This limitation is also stated in Article III, which specifically includes the Charter of the United Nations as one aspect of international law. _Id_. Art. III.

457. _Id_. Art. IX.

458. _Id_. Arts. VI & VII.

459. _Id_. Arts. V, IX & XI.

460. _Id_. Art. IV.

the Registration Convention,[461] the Liability Convention,[462] the Moon Treaty,[463] the Nuclear Test Ban Treaty,[464] and the ITU Radio Regulations.[465] Nations may also agree to limit their freedom of use on a bilateral basis; the Antiballistic Missile Treaty is one example.[466] Various other limitations on the

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461. "Convention on Registration of Objects Launched into Outer Space," Jan. 14, 1975, T.I.A.S. 8480, 18 ILM 891 (effective Sept. 15, 1976). This Convention requires States to register space objects with the U.N. and to provide certain information on them.

462. "Convention on International Liability for Damage Caused by Space Objects," March 29, 1972, 24 U.S.T. 2, T.I.A.S. 7762 (effective Oct. 9, 1973). This Convention elaborates international rules and procedures concerning liability for damage caused by space objects.

463. Moon Treaty, *supra* n. 418. This agreement sets certain limits on the permissible activities of States on the Moon and other celestial bodies.

464. "Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water," Aug. 5, 1963, 14 U.S.T. 1313, T.I.A.S. 5433, 480 U.N.T.S. 43 (effective Oct. 10, 1963).

465. The Table of Frequency Allocations is a limitation on use of outer space. Generally, frequencies for communication with space objects may only be used in accordance with the Table. 1982 Radio Regulations, *supra* n. 1, Art. 6, No. 340.

466. "Treaty With the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems," May 26, 1972, 23 U.S.T. 3435, T.I.A.S. 7503 (effective Oct. 3, 1972). Among other things, this Treaty prohibits deployment of a space-based ballistic missile defense. *Id*. Art. V.

general freedom of use of outer space have been the subject of discussion within COPUOS.[467]

In short, although the principle of freedom of use is broad, it has always been limited in certain respects, and is subject to continued limitation through international agreement.

6.2.2 The Non-Appropriation Principle

Article II of the Outer Space Treaty provides that "[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[468] The purpose of the non-appropriation principle was to implement the freedom of use principle.[469] Appropriation of areas of outer space would greatly restrict the freedom of use by other nations. It can also be seen as an implementation of the common interests provision, since appropriation of an area of

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467. The two most significant involve potential limitations on direct broadcast satellites, and nuclear power sources used on spacecraft. See Christol, _supra_ n. 149, at Chapt. 12 & 14, respectively.

468. OST, _supra_ n. 446, Art II.

469. Christol. _The Geostationary Orbital Position as a Natural Resource of the Space Environment_, 26 Netherlands Institutional L.R. 5, 12 (1979).

outer space would only benefit the appropriating state.

Appropriation is generally considered to be the taking of property for exclusive use with a sense of permanence.[470] Appropriation of outer space, therefore, is "the exercise of exclusive control or exclusive use on a permanent basis" of outer space.[471] Failure to define other important terms, however, has given rise to some controversy.

"Outer space" is one important term the Treaty fails to define. Two issues have been raised concerning its meaning. One issue involves the spatial area included within the term "outer space." This is the definition/delimitation problem discussed _supra_ in relation to the Bogota Declaration.[472] The other issue involves the subject matter of appropriation -- whether natural resources in outer space are included within the prohibition on appropriation of "outer space". One school of thought distinguishes between appropriation of areas of outer space and appropriation of resources. It asserts that the prohibition on appropriation is only applicable to areas. The space powers have supported this view. They consider the

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470. Emerging Principles, _supra_ n. 450, at 276; Gorove, _Interpreting Article II of the Outer Space Treaty_, 37 Fordham L. Rev. 349, 352 (1969).

471. Emerging Principles, _supra_ n. 450, at 276.

472. See _supra_ n. 443 and accompanying text.

natural resources of outer space to be in the same legal category as resources of the high seas.[473] The weight of opinion supports this position.[474] Nevertheless, a minority position contends that the prohibition applies to resources as

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473. See generally Emerging Principles, supra n. 450, at 278-79.

474. Neither Article II, nor any other part of the Outer Space Treaty contains a reference to "resources." Wassenbergh, Speculation on the Law Governing Space Resources, V AASL 611, 616 (1980). Goedhuis has stated that "whereas under the terms of the Space Treaty the appropriation of areas of outer space is prohibited, the Treaty has not prohibited the appropriation of the natural resources of that space." Goedhuis, Some Legal Aspects of the Use of Communication Satellites, XVII Colloquium 53, 56 (1974). Goedhuis based his conclusion on a study of the Treaty negotiating history which indicates both western and communist nations considered that freedom of exploration and use included freedom to take and use natural resources. This was analogous to the traditional freedom of the high seas which prevented appropriation of the seas, but permitted use of its resources. Negotiation of another Treaty also supports this view. The Moon Treaty contains provisions for establishment of an international regime to manage the exploitation of moon resources. Moon Treaty, supra n. 418, Art. VII. During the Treaty negotiations, one contested issue was whether a moratorium, express or implied, should be placed on resource exploitation pending formation of the international regime. None of the opposing views expressed the position that Article II of the Outer Space Treaty already prohibited appropriation of the moon's resources. See Gorove, supra n. 442, at 449 n. 32; and see also Gorove, supra n. 470, at 350.

475. Gorove has stated that the term "outer space" "could be interpreted to include [the] natural resources as well." (emphasis added) Gorove, Utilization of the Natural Resources of the Space Environment in the Light of the Concept of Common Heritage of Mankind, in "The Settlement of Disputes on the New Natural Resources", at 105 (1983). Christol has written in reference to Article II that "it was accepted that no claimant should be allowed to have exclusive control of the whole of the space environment or of its components, including its natural resources." Christol, supra n. 149, at 46.

well as areas.[475]

The meaning of "national" appropriation has also been the subject of debate. This issue revolves around whether the Treaty prohibits only appropriation by nations, or whether it also covers appropriation by individuals and international organizations. Although one author has argued that appropriation by an individual is not prohibited,[476] virtually all others support the view that nations are responsible for the actions of their nationals which occur in outer space, and therefore appropriation by individuals is prohibited.[477] Similar considerations apply to "appropriation" by an international organization; nations bear responsibility for outer space activities conducted by an international organization in which they participate.[478]

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476. Gorove, supra n. 470, at 351.

477. See Emerging Principles, supra n. 450. at 279-81, and authorities cited therein.

478. OST, supra n. 446, Art. VI. Exercise of exclusive control over a resource by a regime established for the "common heritage of mankind", however, might not be considered "appropriation," but rather as activity in furtherance of the common interests principle. See infra Section 6.2.3.

6.2.3 The Common Interest and Common Heritage Principles

Article I of the Outer Space Treaty provides that use of outer space "shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."[479] Although this provision of the Outer Space Treaty is ambiguous, it is an integral part of the Treaty and is legally binding.[480] A wide range of views have been expressed on the meaning of this provision. On one extreme is the view that the provision constitutes only a declaration of intent. On the other extreme is the view that it establishes a requirement for states to share all benefits derived from the use of outer space with all other countries.[481] The latter view has received little support. In general, this provision "has not been regarded as requiring states to share the

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479. OST, supra n. 446, Art. I.

480. During the Treaty's negotiation in COPUOS, a decision was made to insert this provision in the body of the Treaty as opposed to the Preamble. See Emerging Principles, supra n. 450. at 330-31, and authorities cited therein. Additionally, during the negotiations several delegations issued statements emphasizing the binding nature of this provision. Valters, Perspectives In the Emerging Law of Satellite Communications, 5 Stanford J. Int'l Studies 53, 57 (1970). See also Christol, supra n. 149, at 42 ("There can be no doubt that by accepting these terms States became legally bound by them.").

481. See Emerging Principles, supra n. 450. at 327, and authorities cited therein.

benefits in any specific manner, but rather as expressing a desire that the activities be beneficial in a general sense."[482] It also creates a general obligation for space powers "*to act responsibly towards the international* community."[483]

Closely related to the common interests principle is the *principle of the common heritage of mankind.* This principle is not included within the Outer Space Treaty. It is significant, however, because of its close relationship to the common interests provision.[484] Although legally undefined, one author has identified four elements of the common heritage of mankind. They are: (1) the area involved is not legally subject to appropriation; (2) all States share in its management; (3) all States share in the benefits derived; and (4) the area is dedicated exclusively to peaceful purposes.[485] The "distinctive characteristic" of the common heritage of

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482. Gorove, supra n. 442, at 448. The practice of states also confirms this interpretation. In contrast to their efforts to ensure their future access to outer space, states have not demanded a share of moon samples brought back to earth, access to *satellites, or other specific benefits that have already* been received by some nations.

483. Emerging Principles, supra n. 450, at 332.

484. For a discussion of the development of this concept see Cocca, The Advances In International Law Through The Law of Outer Space, 9 J. Space L. 13 (1981).

485. See Emerging Principles, supra n. 450, at 338.

mankind is the establishment of an international regime to manage the exploitation and sharing of resources.[486] Such a regime is envisioned for the moon in the Moon Treaty, which declares that "[t]he moon and its natural resources are the common heritage of mankind . . . ."[487] and establishes an international regime to manage and ensure an "equitable sharing" of the benefits derived.[488] Although that Treaty is not yet effective, it does indicate that an area of outer space can be established as a common heritage of mankind. Resolution No. 3 can be viewed as an effort to bring the geostationary orbit within the concept of the common heritage of mankind.[489]

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486. Id.

487. Moon Treaty, supra n. 418, Art. 11.1. The Moon Treaty has been referred to as an "implementation of the common interests provision of the Outer Space Treaty . . ." Gorove, supra n. 475, at 108.

488. Moon Treaty, supra n. 418, Art. 11.5-7.

489. 1982 Radio Regulations, supra n. 1, Resolution 3. One author is of the opinion that "[e]very hallmark of the common heritage of mankind principle is now present in the geostationary satellite communications environment." Rothblatt, supra n. 6, at 192. However, the international regime which now governs the geostationary orbit is not the type envisioned by the common heritage of mankind concept. The current regime does not manage the use of the orbit, but merely establishes a regulatory framework and facilitates bilateral coordination among states. The management of the BSS by the existing Plans is a small part of the current use made of the geostationary orbit and does not involve any systems which are operational.

6.2.4 Summary of the Fundamental Principles

The fundamental principles of space law may be analyzed separately to study their general nature. They operate as a system of general provisions, however, not individually. Moreover, they must be viewed in light of the purpose of the Outer Space Treaty. That purpose was not to regulate specific activity in outer space, but rather to establish general principles which could be further defined as activities required.[490] The treaties adopted subsequent to the Outer Space Treaty have begun to provide that definition.[491] As use of outer space demonstrates the necessity for further regulation of activities, it is anticipated that states will attempt to reach new agreements. The Space WARC can be seen as part of that process in the evolution of the legal regime of outer space.

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490. Christol, supra n. 149, at 42. A U.S. delegate observed that "[t]he aim of the negotiators had not been to provide in detail for every contingency in the exploration and use of outer space but rather to establish a set of basic principles. That is why the provisions of the Treaty were purposefully broad." U.N., Official Records of the General Assembly, Eighteenth Session, First Committee, Summary Records of Meetings, 17 Sept. - 11 Dec. 1965, at 159-91 (1965).

491. Generally, subsequent agreements between the parties to a treaty may be taken into account when interpreting the former agreement. Vienna Convention on the Law of Treaties, U.N. Doc. A/CONF. 39/27, Art. 31 (3) (a), (May 23, 1969), 8 ILM 679 (1969). The number of parties signing the subsequent agreement would be important to the weight to be given that agreement.

6.3 Application to the Geostationary Orbit

6.3.1 The Current Regulatory Regime: First-Come, First-Served

The current regulatory regime permits use of the orbit/spectrum resource which is indefinite in time and potentially permanent.[492] Due to the physical nature of interference, it could be argued that such use is also exclusive, at least for the frequencies used. These facts raise the issue of appropriation.

The application of the non-appropriation principle to the geostationary orbit arose in the COPUOS Working Group on DBS. The French delegate stated that "the very use of geostationary satellites can be regarded as an "appropriation" of the equatorial orbit which is a privileged portion of space."[493]

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492. See supra n. 296, and accompanying text.

493. U.N. Doc. A/AC.105/62, (1969), at 3-4.

In response, the delegate of the U.S. stated:

> The negotiating history of the Treaty shows that the purpose of this provision (article II) was to prohibit a repetition of the race for the acquisition of national sovereignty over overseas territories . . . The Treaty makes clear that no user of space may lay claim to, or seek to establish national sovereignty over outer space . . . On the other hand, the use of space or a celestial body for activities that are peaceful in character and compatible with the provisions of the Outer Space Treaty is, by definition, entirely legitimate. Using a favorable orbit for a legitimate activity cannot reasonably be classified as a prohibited national appropriation in the sense of Article II . . . using a favorable geostationary orbit is no more an "appropriation" or "*de facto* occupation" than using a particular favorable area of the lunar surface - the Sea of Tranquility, for example - for a manned landing.[494]

Jakhu believes that the French position went too far; it would "prohibit each and every use of the orbit which [would] be contrary to the Treaty's provisions."[495] He also believes that the U.S. statement did not go far enough; it did not address itself to the problem of continued and exclusive use which could amount to *de facto* appropriation.[496] Jakhu concluded that "the current practice of first-come, first-served is contrary to the principle of non-appropriation of outer space,

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494. U.S. Delegation to the Second Session of the Working Group on Direct Broadcasting Satellites, Statement by the U.S. representative, Herbert Reis, at the Working Group Meeting, July, 31, 1969 (cited in Valters, *supra* n. 480, at 66-67.)

495. Jakhu, *supra* n. 451, at 22.

496. *Id.*

497. *Id.* at 21.

and hence, should be changed."[497] He opined that every use would be legitimate so long as it did not "exclude others permanently from such use or impose undue restrictions."[498] Although he did not specify what he meant by "undue restrictions", his emphasis was on the duration of use.[499]

The fundamental question regarding the appropriation issue is whether Article *II* of the Outer Space Treaty applies to use of the geostationary orbit/spectrum resource.[500] If it does not apply, then the actual or potential duration of the use is legally irrelevant to the issue of appropriation. In the opinion of this author, Article II is not applicable to use of the orbit/spectrum resource. The framework for this conclusion examines three questions: (1) whether use of the geostationary orbit by a telecommunication satellite is an appropriation of an area of outer space even if the use is permanent; (2) whether outer space resources are included within Article II; and (3) assuming, arguendo, that outer space resources are included within Article II, whether the orbit/spectrum

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498. Id. at 23 (emphasis added).

499. Valters also considers the key to be duration of use. He has stated that "the decisive criterion appears to be the permanence of the . . . communications satellite in question." Valters, supra n. 480, at 66.

500. It is use of the orbit/spectrum resource, not just the insertion of a satellite into orbit, which places limitations on use of the geostationary orbit by others. See supra Chapter 1.

"resource", in particular, is included.

The first question focuses on an appropriation of an _area_ of outer space. As discussed _supra_, appropriation of outer space is "the exercise of exclusive control or exclusive use on a permanent basis."[501] While use of a geostationary satellite may be potentially permanent, geostationary satellites do not occupy the same area of outer space for any significant period of time. They are small, and constantly in motion.[502] Although at any particular point in time a geostationary satellite does exclusively occupy a specific area of outer space equal to its volume, due to the satellite's motion that specific area is constantly changing. Occupation of that specific area, therefore, cannot be deemed appropriation because its duration is very short --- certainly not permanent, or even potentially permanent.[503]

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501. _supra_ n. 471.

502. Most satellites have a diameter less than 25 meters. The Geostationary Orbit, _supra_ n. 4, at 7. A satellite in the geostationary orbit is constantly moving because of the many forces acting upon it. See _supra_ n. 4 and accompanying text.

503. Large space structures which did occupy a specific area of space for a long period of time would present a different issue. One author, however, extends this argument even further; he asserts that satellites do not appropriate outer space by their presence because the volumes occupied by satellites are "really more a part of the space object than they are a part of space itself." Rothblatt, _State Jurisdiction and Control in Outer Space_, 26 Colloquium 135, 136 (1983). Under that rationale, even large space structures may not appropriate outer space.

There is another issue that must be examined prior to concluding that geostationary telecommunication satellites do not appropriate any area of outer space. Over a period that _is_ potentially permanent, a geostationary satellite remains within a certain limited area of outer space.[504] One could assert that this larger area is appropriated since the use would exclude some other satellites.[505] But this assertion fails because although the permanency aspect of appropriation would arguably be established, the exclusivity required for appropriation would not. To understand this, the physical shape and size of this area must be appreciated. A telecommunication satellite normally remains within a three dimensional area which is about 150 Km on each side, and 30 Km thick.[506] This results in a volume of about 270,000 cubic Km. Although a small degree of separation is desirable to reduce the danger of collision,[507] other satellites can operate

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504. It is able to remain in this area because of its station keeping ability. See _supra_ n. 5 and accompanying text.

505. Other satellites with similar characteristics may be excluded due to radio frequency interference. See _supra_ Section 1.2.2.

506. See _supra_ n. 5 and accompanying text.

507. With satellites of the current size the danger of collision is less than one every 500 years. See _supra_ n. 28.

within that same area of outer space.[508] Therefore, use of an orbital location by a geostationary satellite is not exclusive, and appropriation of an <u>area</u> of outer space is not established.

The next question under the appropriation issue is whether Article II applies to outer space resources. As discussed <u>supra</u>, the weight of opinion holds that Article II is not applicable to resources of outer space.[509] If this position is accepted as correct, further analysis is unnecessary since Article II would not be applicable to the orbit/spectrum resource. In order to continue the analysis of this issue, however, it shall be assumed that Article II does apply.

If Article II applies to outer space resources, the next question is whether it applies specifically to the

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508. Satellites operate from the same orbital location by using different frequencies, different polarizations, or by serving separated geographical areas. See <u>supra</u> Section 1.1.2. The Radio Regulations do not require Coordination based on collision potential, only on frequency interference. 1982 Radio Regulations, <u>supra</u> n. 1, Art. 11. It is not the practice of administrations to coordinate satellite location with each other if there are no frequency interference problems, even if they will share the same nominal orbital location. Although the potential of collision "is in the back of everybody's mind", it is considered remote enough not to warrant coordination. Interview with Mr. Gomaa E. Abutaleb, INTELSAT's Coordinator for ITU on Technical Matters, in Washington, D.C. (October 31, 1984). Consequently, no station-keeping activity is conducted in an attempt to separate satellites operating from the same nominal orbital location. <u>Id</u>.

509. See <u>supra</u> n. 474 and accompanying text.

orbit/spectrum resource. According to the ITU Convention, radio frequencies and the geostationary satellite orbit are "natural resources."[510] Before focusing on the orbit/spectrum resource, these individual components should be examined to determine whether they are covered by Article II. The geostationary orbit is a specific quantifiable area of outer space and could be considered an outer space resource.[511] By itself, however, it is only an area of outer space, and it has already been determined that use of the geostationary orbit by a telecommunication satellite does not appropriate an area of outer space. Radio frequencies, on the other hand, would not appear to be an outer space resource. While they may travel to the earth from a geostationary telecommunication satellite in space, the signals originate on earth and are merely relayed back. Moreover, just as frequencies used for communication with ships on the high seas and airplanes in the air are not considered to be sea and airspace resources, frequencies used for space telecommunication should not be considered to be space resources.

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510. 1982 ITU Convention, supra n. ·2, Art 33 (2).

511. One author points out, however, that "[i]t is questionable whether the orbit as such is a natural resource in itself. If it is, it is not a limited natural resource; use does not deplete the orbit as a resource." Wassenbergh, supra n. 474, at 615.

It is therefore necessary to directly address the issue of whether Article II applies to the orbit/spectrum resource. That "resource" is unlike any other resource of outer space. It is not a tangible part of outer space like minerals on the moon. Rather, it is an intangible factor over which possession is impossible. It is referred to as a "resource" to emphasize its factually limited aspect, not as a legal classification. It is only conceptually a "resource" because of the physical phenomenon of interference. If it were not for radio frequency interference, the "orbit/spectrum" combination would probably have never been conceived of as a "resource."

In addition to being an intangible concept, the orbit/spectrum "resource" has many characteristics which determine whether use of one particular portion of the "resource" is an exclusive use. The orbit/spectrum "resource" is not simply a combination of an orbital location and a particular portion of the radio frequency spectrum. It is a complicated collection of many factors which determine whether two or more satellites can operate from the same geostationary orbital location.[512]

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512. Use of the C band by a geostationary satellite at location X, with a spot beam on city Y, for example, may only constitute an exclusive use of those same characteristics. Another satellite could use location X and serve city Y on another frequency, or use location X and the same frequency and serve city Z. See <u>supra</u> Section 1.2.

Another distinctive quality of the orbit/spectrum resource that sets it apart from true resources is its unquantifiable nature. Limits of resources may be unknown due to undiscovered sources, but they are at least quantifiable. Even the geostationary orbit has a quantifiable area. The orbit/spectrum resource, on the other hand, cannot be quantified.[513] Its limits depend on technology and they may expand indefinitely.

A final consideration is the ordinary meaning of the term "outer space." Treaties should be interpreted in accordance with the ordinary meaning of their terms.[514] One may question whether "outer space" includes *tangible* resources located in outer space. It would be going far beyond the ordinary meaning of that term, however, to read into it application to the orbit/spectrum "resource."

In conclusion, use of the geostationary orbit pursuant to the current regulatory regime of the ITU does not constitute an appropriation of outer space in violation of Article II of the Outer Space Treaty regardless of the duration of the use. A geostationary satellite does not appropriate an area of outer

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513. See supra n. 83 and accompanying text.

514. Vienna Convention on the Law of Treaties, supra n. 491, Art. 31.

space, and Article II is not applicable to appropriation of outer space resources. Moreover, even if Article II does apply to such resources, the orbit/spectrum resource is not a resource of outer space encompassed by that provision. This result, however, does not end the inquiry regarding the validity of use of the geostationary orbit under the current ITU regulatory regime. The other limitations on the freedom of use principle must be examined.

One of these limitations is the common interests provision. Use of outer space is to be carried out "for the benefit and in the interests of all countries . . . ."[515] One author determined that "there is no indication that the benefit must be either material or direct. An indirect benefit may be sufficient."[516] In practice, the benefits from space telecommunication have inured to the vast majority of the countries of the world. Any nation may establish an INTELSAT station for a modest cost and become part of a world-wide telecommunications network. For countries that have done so, the benefits from the use of the geostationary orbit have been direct. With these factors in mind, it has been concluded that the activities of space telecommunication are "generally

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515. OST, <u>supra</u> n. 446, Art. I.

516. Gorove, <u>Freedom of Exploration and Use in The Outer Space Treaty: A Textual Analysis and Interpretation</u>, Den. J. Int'l L. & Policy 93, 101 (1971).

beneficial to all countries . . . [and] . . . satisfy the requirement of the common interest clause."[517]

Article I of the Outer Space Treaty provides three other limitations on the freedom of use of outer space. Use must be in accordance with (1) international law, and allow for free use by other states (2) "on a basis of equality" and (3) "without discrimination of any kind."[518] The current legal regime appears to satisfy the criteria regarding compliance with international law. The current regime is not only in accordance with international law, it is a part of international law.[519] In addition, the basic ITU regulatory regime for the space services was taken from the regime used for decades by the terrestrial services.[520] There have been no significant assertions that the terrestrial regime violated principles of international law. Therefore, the current ITU regulatory regime is in accordance with international law.

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517. Id.

518. OST, supra n. 446, Art. I.

519. One of the sources of international law is international agreements. See Brownlie, Principles of Public International Law at 12-14 (1979). The ITU Convention and the Radio Regulations, which establish the regulatory regime, are both international treaties. Mili, supra n. 103, at 181 & 287.

520. See supra Section 4.1.

The current regime also appears to satisfy the equality requirement. All states are treated on an equal legal basis. Although the firstcomer has priority, the regime does not establish the firstcomer, it could be any state. As noted by one author:

> There seems to be no reason why the principle of free use of outer space by all states on a basis of equality should result in an obligation for any state to refrain from using certain orbital satellite positions in favor of another state. The principle of equal use only offers an equal <u>legal</u> chance to each state of being the first one to use this or that orbital position, it does not create actual equality among states . . . it cannot empower a state to make use of its space rights.[521] (emphasis added)

Another author, however, has opined that if a number of states monopolized the geostationary orbit "such a situation might be contrary to the "equality" principle . . . ."[522] Even if this statement is legally correct, such a situation is unlikely to result. History indicates that technological advancement will forestall creation of a monopoly, although more advanced and more expensive technology may need to be employed. Nevertheless, the regulatory regime would still treat all countries equally; the basis for use would be the same for all states even though all states could not take equal advantage of

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521. Von Kries, <u>The Legal Status of the Geostationary Orbit [:] Introductory Report</u>, 18 Colloquium 27, 29 (1975).

522. Haanappel, <u>Article II of the Outer Space Treaty and the Status of the Geostationary Orbit</u>, XXI Colloquium 28 (1978).

the opportunity. In other words, legal equality would still exist, although factual equality would not. Such a situation might, however, present problems relating to discrimination.

A significant issue is presented by the current regulatory regime vis a vis the non-discrimination clause. One author has concluded that this provision, when read together with the Preamble and other Article I provisions,

> implie[s] that the economic or scientific underdevelopment of states is not a reason for their freedom to be jeopardized by the more developed states. Similarly, if certain states are able, only at a later stage, to make use of outer space, their freedom shall not be circumscribed by those states fortunate enough to already possess the required technological capability.[523]

If the current first-come, first-served regime continues, cost of access to the geostationary orbit may increase due to the more advanced technology required. If so, one could argue that the latecomers have been discriminated against because of their "economic or scientific underdevelopment." Certainly their freedom of use will have been "circumscribed" by the prior use of other nations. Another way of looking at this situation, however, is that at the time they are ready to use the geostationary orbit, the latecomers would be on the same legal footing as everyone else. All states which seek access to the geostationary orbit are required to follow the same procedures

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523. Jakhu, supra n. 86, at 153.

and have the same technological constraints. Thus, one could argue that the regulatory regime is not discriminatory even though its effects may be.

The issue thus becomes whether the discrimination provision covers _de facto_ in addition to _de jure_ discrimination, and if so, whether it has occurred. If taken literally, the phrase "without discrimination _of any kind_" would include _de facto_ discrimination. Moreover, such an interpretation would seem to comport with the purpose of the Outer Space Treaty. As stated by a representative of the U.S., the Treaty was designed to be "a strong safeguard for the interests of those States which have at the present little or no space programs of their own."[524] Therefore, this provision should be interpreted to include _de facto_ discrimination within its scope.

The issue of whether _de facto_ discrimination has occurred is more complex. Under the current regime there have been some difficulties effecting Coordination.[525] No state, however, has been prevented from establishing a system along the lines it desired. Thus, it is difficult to conclude that the current regulatory regime has resulted in _de facto_ discrimination. Nevertheless, the regime does not preclude discrimination in

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524. U.N., _Official Records of the General Assembly, First Committee_, at 16, U.N. Doc. A/C.1/PV. 1492 (1966).

525. See _supra_ n. 275 and accompanying text.

the future. Therefore, it could be argued that by establishing a legal framework within which such discrimination could result, the regime violates the spirit of the Outer Space Treaty. It would appear, however, that the regime currently complies with the letter of the Treaty.

Another provision relevant to this issue is Article IX. If a situation developed where access to the geostationary orbit could be obtained only through the use of expensive technology, one could question whether the firstcomers had given "due regard to the corresponding interests of all other States . . ."[526] This must be determined based on the facts as they unfold. While the current situation does not reach that extent, it may not be far off.

In summary, although the first-come, first-served regulatory regime does not violate the fundamental principles of international space law, issues arise regarding the Article I non-discrimination provision and the Article IX provision of due regard for the corresponding interests of other states. Resolution of these issues is largely dependent upon the course of future events. There _may_ come a time when use of the geostationary orbit by developed states is so pervasive that developing countries which are ready to use the orbit cannot do

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526. OST, _supra_ n. 446, Art. IX.

so in the manner and with the technology they desire. Their freedom of use will have been restricted. It does not appear that point has been reached. The current regime, however, would not only permit such a situation to occur, it would also protect it. If that situation should develop, it could be said that the developed countries had overlooked their obligations under space law to the developing countries.

6.3.2 The Current Regulatory Regime: The Broadcasting Satellite Service

The BSS is the only planned space service. Two Plans are involved.[527] Although both Plans allot orbit/spectrum resources to individual countries, national appropriation of outer space is not established due to the same reasoning applicable to the other regulatory regime. The Plans do not appropriate an area of outer space. If anything, they appropriate a portion of the orbit/spectrum resource. While some resources may be covered by the non-appropriation principle, the orbit/spectrum resource is not one of them.[528]

The equality and discrimination provisions are also

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527. For details of these Plans see <u>supra</u> Section 5.1.

528. See discussion <u>supra</u> n. 510 - 514 and accompanying text.

satisfied. Although both Plans allot varying quantities of the orbit/spectrum resource to different countries, that was not the result of discrimination or treatment in a legally unequal fashion. To the contrary, the Plans were based on each country's demonstrated needs.[529] Differences in allocations are the result of factual differences in the states' requirements. Moreover, Article IX of the Outer Space Treaty has also been followed. Participation in the planning conference evidences co-operation, mutual assistance and regard for the corresponding interests of other States.

Both Plans are also in accord with international law. Similar plans existed for terrestrial services prior to the development of these Plans.[530] Additionally, the BSS Plans are international agreements.[531]

Finally, the common interests principle is not violated by these Plans. They were the result of efforts by countries to ensure their equitable access to the orbit/spectrum resource for their BSS needs. The Plans may be regarded as an exercise

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529. See U.S. RARC Report, supra n. 373; and Canada Region 2 Report, supra n. 391.

530. See supra n. 377 and accompanying text.

531. The 1977 Plan has been incorporated in the Radio Regulations. See 1982 Radio Regulations, supra n. 1, Appendix 30. The 1983 Plan will become part of the Radio Regulations when the Space WARC takes the appropriate action. See infra n. 599 and accompanying text.

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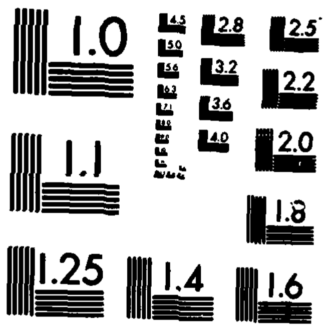

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which implements and gives definition to the common interests principle. In fact, this type of spectrum management and enforced sharing is a move toward a common heritage of mankind regime for the geostationary orbit.[532]

In conclusion, although these Plans place restrictions on the freedom of use of outer space, the restrictions were established pursuant to the common interests principle and do not violate principles of space law.

6.3.3 Proposed Methods of Ensuring Equitable Access

The methods for ensuring equitable access which have been discussed within the CCIR generally range from schemes very similar to the current first-come, first-served regime, to those similar to the 1977 BSS Plan.[533] Therefore, the preceeding discussion regarding application of principles of space law to those regimes is applicable to the CCIR proposals. Only proposals which significantly differ from the current regimes will be addressed in this section. Moreover, since those proposals are broad concepts containing few details, comments will be of a general nature and identify

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532. See <u>supra</u> n. 484-489 and accompanying text.

533. See <u>supra</u> Section 5.2.

issues that should be further examined if one of the proposals is seriously considered at the Space WARC.

One group of proposals advocates an increased role for common user organizations.[534] One aspect of these proposals, the establishment of a priority within the regulatory regime for common user organizations, warrants examination. Currently, there is no priority for such organizations; they are on the same footing as the individual nations which act on their behalf in the ITU.[535] Priority might be given to common user organizations in order to encourage countries to combine their requirements and use the orbit/spectrum resource more efficiently.[536] Depending upon how this priority was established, certain issues would be raised. It could affect freedom of use by nations and raise an issue relating to the equality provision. It could also be said to discriminate against countries which did not form common user organizations. These issues should be considered in formulating any priority that may be granted. Nevertheless,

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534. See _supra_ n. 408 - 411 and accompanying text.

535. See _supra_ n. 158.

536. Priority for common user organizations regarding their choice of orbital location would recognize that "orbital locations for a common user system may be more constrained by the geographical location of the various users . . ." than a system for a single country would. CCIR Preparatory Meeting ORB-85, Joint Meeting, Doc. B/152 (Rev. 1)-E, at 15 (July, 1984).

because common user organizations do lead to a more efficient use of the orbit/spectrum resource, all nations benefit generally from such organizations even if they are not a direct participant. Therefore, a priority for common user organizations could be viewed as advancing the common interests principle.

Another group of proposals is aimed at establishing a market system.[537] Such proposals could result in the orbit/spectrum resource being treated as a commodity that could be leased or sold. If all nations agreed on the division, such a regime might be viewed as being in the common interest. A significant issue regarding restrictions on freedom of use, however, would be raised.

Finally, one other group of proposals suggests creation of an international regime for the geostationary orbit under the direction of the ITU or the U.N.[538] If the regime encompassed the entire orbit for all uses, an appropriation issue would be raised.[539] Additionally, if the regime established user fees

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537. See _supra_ n. 412 - 414 and accompanying text.

538. See _supra_ n. 415 and accompanying text.

539. The geostationary orbit itself could be considered a resource of outer space. This issue, however, is not settled. See _supra_ n. 511 and accompanying text. This would also raise the question of whether appropriation by an international organization is covered by the non-appropriation principle. See _supra_ n. 478 and accompanying text.

or conditions for use, there would be a restriction on freedom of use. The legality of such a regime could only rest on the common interests principle. In all probability, the regime would declare the geostationary orbit to be the common heritage of mankind;[540] it would therefore be legally analogous to the regime provided for in the Moon Treaty.[541] Absent agreement by the vast majority of nations that such a regime was in the common interests, however, its validity would be very doubtful because of the significant restrictions on freedom of use it would entail.[542]

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540. See <u>supra</u> Section 6.2.3.

541. Moon Treaty <u>supra</u> n. 418.

542. Christol has stated that the establishment of an international organization to allocate the geostationary orbit "would require changes" to the Outer Space Treaty. Christol, <u>supra</u> n. 469, at 11. Another author has a contrary opinion. See Rankin, <u>Utilization of the Geostationary Orbit - A Need for Orbital Allocation</u>, 13 Columbia J. Transnat. L. 101 (1974).

Chapter 7

THE MANDATE OF THE SPACE WARC

In 1984, the Administrative Council, acting pursuant to Resolution No. 3 of the 1979 WARC[543] and to directions of the 1982 Plenipotentiary Conference,[544] established an agenda for the first session of the Space WARC. The scope of the Agenda is very broad. Although it includes matters other than those specified in Resolution No. 3, the issues posed in that Resolution will be the key aspect of the Conference. The "essential objective" of the Conference is "to guarantee in practice, for all countries, equitable access to the geostationary-satellite orbit and to the frequency bands allocated to the space services utilizing it . . . .[545] This Chapter examines the concept of "equitable access" as it relates to the Space WARC and reviews the Agenda provisions aimed at guaranteeing equitable access. It then explores other

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543. 1982 Radio Regulations, _supra_ n. 1, Resolution No. 3.

544. 1982 ITU Convention, _supra_ n. 2, Resolution No. PLA/5.

545. Agenda, _supra_ n. 139, noting (a).

Agenda provisions which relate to the Broadcasting Satellite Service.[546]

7.1 The Objective: "Equitable Access"

The concept of "equitable access" was incorporated into the ITU Convention in 1973.[547] Although the term "equitable access" has never been defined in the Convention, it is generally agreed that "equitable" does not mean "equal."[548] Instead, equity implies "fairness" and "justice" taking all relevant circumstances into consideration.[549] The ITU Convention specifies certain of those circumstances.

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546. Based upon decisions made, the Conference must also: "specify the preparatory actions required to be completed before the commencement of the Second Session of the Conference; recommend a draft agenda for the Second Session . . .; [and] evaluate the financial impact of its decisions upon the budget of the Union . . ." Id. para, 5.2 - 5.4.

547. See supra n. 339 and accompanying text.

548. Christol, National Claims for the Using/Sharing of the Orbit/Spectrum Resource, XXV Colloquium 295, 298 (1982); Gorove, Principles of Equity in International Space Law, XXVI Colloquium 17, 18 (1983).

549. Id.

According to the 1973 Convention, countries were to have equitable access to the orbit/spectrum resource "according to their needs and the technical facilities at their disposal."[550] This language seemed to imply that a country without a "need" and "technical facilities" did not require equitable access. It permitted an interpretation of Article 33 which would disregard countries without a present need and ability to use the orbit/spectrum resource from present considerations of equitable access. That provision was unpopular with developing countries who wanted to ensure their access to the orbit/spectrum resource in the future. At the 1982 Plenipotentiary Conference, those countries succeeded in amending Article 33 (2) to delete that language and provide instead that countries should have equitable access to the orbit/spectrum resource "taking into account [1] the special needs of the developing countries and [2] the geographical situation of particular countries."[551]

When the change to Article 33 was proposed at the Plenipotentiary Conference, it was the subject of considerable debate. Most developing countries supported deletion of the phrase "according to their needs and the technical facilities

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550. 1973 ITU Convention, *supra* n. 339, Art. 33 (2).

551. 1982 ITU Convention, *supra* n. 2, Art. 33 (2). Similar language was also added to Article 10. *Id*. Art. 10 (4) (c).

at their disposal"[552] because they believed it was discriminatory.[553] Developed countries were generally concerned that deletion of the phrase and substitution of language identifying the "special needs of the developing countries", would "imply the introduction of a degree of inequality in favor of developing countries with regard to the use of frequencies in the space radio services."[554]

The 1982 change to Article 33 did not result in inequality favoring the developing countries. It appears that only equal treatment was sought by the nations supporting the change. During the negotiation of the amendment to Article 33 a delegate from one of the countries which proposed the change stated that "[f]ar from instituting an inequality in favour of the developing countries, the text aimed at establishing a fair

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552. 1973 ITU Convention, supra n. 339, Art. 33 (2).

553. The delegate of Algeria stated that "[r]emoval of any reference to needs or available technical facilities would improve or, more importantly, create equal access . . . ITU, Plenipotentiary Conference, Nairobi 1982, Summary Record of the Tenth and Last Meeting of Committee 8, Doc. No. 516-E, at 8 (Feb. 1, 1983) [hereinafter cited as Nairobi Conf.]. The delegate of India agreed and asserted that "[c]ountries should have equal access . . . without suffering penalties because they lacked technical facilities at any given time." Id. Not all developing countries favored this change. The delegate of Brazil "considered that the reference to the needs of countries was justified." Id.

554. Id. at 7.

balance in the use of a limited resource . . .[555] Thus, in determining equitable access the special needs of developing countries must be "tak[en] into account",[556] but they do not entitle them to priority. Those special needs may have most relevance to the issue of efficient and economic use of the orbit/spectrum resource.

Article 33 (2) provides that use must be made "efficiently and economically".[557] Use of the orbit/spectrum resource in the manner most needed by the developing countries, however, may not constitute the most efficient and economical use.[558] Moreover, the need may not be a present need, but a future need. The provision for the special needs of developing countries qualifies the objective of efficient and economic use as applied to developing countries. Mr. T.V. Srirangan, a delegate of India and frequent spokesperson for developing

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555. Nairobi Conf., supra n. 553, at 7. See also Id. Doc. 183-E(Colombia). Statements of other delegates indicate equal access, but not preferential treatment, was the objective of the change to Article 33. See supra n. 553.

An interpretation of this language which gave a preference to developing countries would also raise issues of discrimination and violation of the equality principle. See supra Section 6.2.

556. 1982 ITU Convention, supra n. 2, Art. 33 (2).

557. Id.

558. They may want to use high power satellites, for example, requiring an increase in the minimum spacing between satellites. See supra n. 79 and accompanying text.

countries on telecommunication matters, has addressed this point:

> In principle, the need for exploiting such a resource to maximum advantage may not be questioned. But the criteria for judging efficiency should be determined in the context of the large gaps that divide the developing and the developed countries and the widely differing levels of socio-economic development among them. . . . It is well known that there are several technological means by which [efficiency] can be maximized. Most of them are, however, beyond the reach of a majority of developing countries . . .[559]

An example cited by Mr. Srirangan highlights this issue. Burning fuel oil in a jet engine is a more efficient use than burning it in a wick lamp. The latter use, however, is necessary in developing countries. Similarly, efficient use of the orbit/spectrum resource "cannot be an end in itself: it is only a means of ensuring all countries equitable access to this scarce resource."[560]

The addition of the phrase "taking into account the special needs of the developing countries",[561] therefore, does not grant a priority to developing countries for equitable access to the orbit/spectrum resource. Rather, it acknowledges that in any determination of equitable access, the needs of

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559. Srirangan, _supra_ n. 38, at 6-7.

560. UNISPACE 82, _supra_ n. 27, at 70.

561. 1982 ITU Convention, _supra_ n. 2, Art. 33 (2).

developing countries for particular uses of the orbit/spectrum resource, and for future uses, must be considered on the same basis as the uses made by developed countries. Moreover, they must be considered on the same basis even though the uses made by the developed countries may be more efficient and economical. In other words, the developed countries should not have a priority based on their ability to use the orbit/spectrum resource earlier and more efficiently.

Another issue relates to the meaning of the clause regarding "the geographical situation of particular countries."[562] This language was the result of proposals made by four equatorial countries at the Nairobi Conference.[563] The language of the original proposals was "taking into account the particular needs of the developing countries as well as those of the equatorial countries."[564] The last phrase was an attempt to secure some support for the position of the equatorial countries taken in the Bogota Declaration.[565] The equatorial

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562. 1982 ITU Convention, supra n. 2, Art. 33 (2). Similar language was also contained in Resolution No. 3 ("taking into account . . . the special geographical situation of particular countries . . ."). 1982 Radio Regulations, supra n. 1, Resolution No. 3.

563. Nairobi Conf. supra n. 553, Docs. No. 183-E (Columbia); 184-E (Ecuador); 189-E (Gabon); and 178-E (Indonesia).

564. Id.

565. See Bogota Declaration, supra n. 443.

countries failed to acheive specific recognition and the language adopted constituted a compromise.

The adopted provision favors no particular group of countries. In one important aspect, however, it actually appears to place equatorial countries at a disadvantage. In use of the geostationary orbit, geography generally favors equatorial countries, but causes significant problems for nations with high northern latitudes.[566] Nevertheless, the provision is broad enough to encompass factors other than latitude. For example, because high frequencies are subject to

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566. See _supra_ n. 8 and accompanying text.

One author has noted that:

> Since there seems to be no physical or technical basis for special affinity (to the orbit) on the part of the equatorial countries as well as no difficulty being faced by these countries simply because of their geographical situation, they do not seem to be covered by the provisions of article 33 (2). On the other hand, some of the developed countries whose territories lie in extreme areas, like Canada, the U.S.S.R., the Scandanavian countries, etc. do appear to be entitled to special treatment under article 33 (2), for example, their territories may be covered only by limited segments of the geostationary arc and radio frequencies to/from their territories are subject to physical constraints because of their geographical location. Jakhu, _Recent Developments in ITU's Regulatory Regime and Their Implications for the 1985/88 Space WARC_, 10-11 (1984) (unpublished paper available at McGill University, Institute of Air & Space Law).

significant attenuation by rain,[567] *countries with high* rainfall areas could assert a priority for use of lower frequencies. Since many equatorial countries have areas of high rainfall, they may receive some benefit from this provision.

The legally significant aspect of this provision is that it does not grant equatorial countries any preference as a result of their location on the equator; it lends no support to the Bogota Declaration. The provision means only that if a particular country is affected by a particular geographical situation, that situation should be taken into account in determinations of equitable access.[568] Such an interpretation is in accordance with the plain meaning of the terms, and is appropriate given the physical limitations placed upon use of the radio frequency spectrum by geographical conditions.

A final issue regarding "equitable access" to the orbit/spectrum resource is whether circumstances other than those specified in the ITU Convention may be considered. The Convention specifies two factors that are relevant to equitable

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567. See <u>supra</u> n. 66.

568. *In addition to latitude and rainfall,* other geographical conditions are arguably within the scope of this provision. These could include geographical factors like size, which affects the number of *orbital locations required; and terrain,* which affects the feasibility of terrestrial telecommunication facilities.

access: the special needs of developing countries, and the geographical situation of particular countries. But it does not specify that those factors are the only circumstances relevant to equitable access. Moreover, as mentioned previously, equity generally requires that all relevant circumstances be taken into consideration.[569] Therefore, other circumstances which are relevant to equitable access should be considered at the Space WARC.

One additional circumstance relevant to equitable access is the needs of countries other than developing nations. A United Nations report cited a need to develop criteria for equitable and efficient use of the geostationary orbit "based on the genuine needs . . . identified by each country."[570] The special needs of developing countries can be considered without ignoring the needs of other countries.

Another relevant circumstance is ability to use the orbit/spectrum resource. Although superior ability does not grant a priority, ability is relevant to considerations of equitable access. One author points out that Article 33 still focuses on use of the orbit/spectrum resource.[571] Article 33

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569. See supra n. 549 and accompanying text.

570. UNISPACE 82, supra n. 27, at 71 (emphasis added).

571. Gorove, supra n. 548, at 18.

(2) commences with the words "[i]n _using_ frequency bands for space radio services . . . ."[572] Since use cannot be made without ability, he reasons that "ability must be at the disposal of a country which wishes to take advantage of its guaranteed access."[573]

Current use of the orbit/spectrum resource is another circumstance relevant to equitable access. The various users of the orbit/spectrum resource undertook that use, and the great expense underlying it, with an expectation of protection by the existing ITU regulatory regime. The fairness and justice inherent in equity requires that those users be accommodated in any method of guaranteeing "equitable access" for at least the life expectancy of their satellites.[574]

In conclusion, "equitable access" is not equal access, but rather an access which is fair, taking into account all relevant circumstances. Such circumstances must include the

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572. 1982 ITU Convention, _supra_ n. 2, Art. 33 (2).

573. Gorove, _supra_ n. 548, at 18. This does not mean, however, that later users should be penalized when ready to use the orbit/spectrum resource. As pointed out by Srirangan, "[p]enalties, if any, in any given situation should be shared equally by all." Srirangan, _supra_ n. 38, at 7.

574. Some accommodation should also be provided for systems currently in Coordination. The first session of the Space WARC could indicate that systems submitted for Coordination subsequent to a certain date would be subject to the new regulatory regime.

special needs of the developing countries and geographical conditions. They also include needs of other countries, ability to use, current users, and other relevant factors. It is the task of the delegates to the Space WARC to translate this very general concept into specific technical and regulatory rules and procedures in light of all these circumstances.

7.2 Agenda Provisions Related to Guaranteed Equitable Access

The key provisions of the Space WARC agenda were taken almost verbatim from Resolution No. 3 of the 1979 WARC.[575] They provide that the primary responsibility of the first session of the WARC is to:

> 2.2 decide on the basis of proposals received from administrations, which space services and frequency bands should be _planned_;
>
> 2.3 establish the principles, technical parameters and criteria for the _planning_, including those for orbit and frequency assignments of the space services and frequency bands identified as per paragraph 2.2, taking into account the relevant technical aspects concerning the special geographical situation of

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575. 1982 Radio Regulations, _supra_ n. 1, Resolution 3.

> particular countries; and provide guidelines for associated regulatory procedures;
>
> 2.4 establish, as necessary, guidelines for regulatory procedures pertaining to space services and frequency bands which have not been identified in accordance with paragraph 2.2;
>
> 2.5 consider <u>other possible approaches</u> that could meet the objective of [guaranteed equitable access];
>
> 2.6 identify those bands for which sharing criteria between services (space or terrestrial) need to be developed during the intersessional period for consideration at the second session. (emphasis added)[576]

These provisions raise two related issues regarding their scope -- the definition of the term "planned", and whether the mandate of the Space WARC permits it the latitude to decide not to "plan" any space services.[577]

7.2.1 Scope of the Agenda: To Plan or Not To Plan

In the ITU, the terms "planned" or "plan" have always been associated with the concept of *a priori* planning, where certain frequencies (or orbital slots) are allotted to specific

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576. Agenda, *supra* n. 139.

577. The scope of the Agenda is important because the authority of any WARC is limited by its agenda. 1982 ITU Convention, *supra* n. 2, Art. 7.2.

578. Srirangan, *supra* n. 38, at 8; and *supra* n. 376 and accompanying text.

countries.[578] Nevertheless, several developed countries indicated at the 1979 WARC that they considered the term, as used in Resolution No. 3, to have a much broader meaning. The U.S. Delegate issued a statement declaring that

> the [U.S.] views the planning mandate of the next Space Conference as being very wide in scope, admitting of a broad range of possibilities ranging from detailed orbit/frequency assignment plans to more dynamic planning approaches that will provide access to the orbit/spectrum in an equitable manner as the real requirements of administrations arise.[579]

The U.S. delegate specifically decried "1977 WARC-type planning" as a potential approach for the fixed satellite service and summarized the difficulties such an inflexible plan would entail.[580] He ended by stating that the U.S. considered the terms "planned" and "planning," as used in the Resolution, "must be interpreted in a broad and flexible sense."[581] Since neither the Resolution nor the Agenda define the term "planned", differences of opinion regarding its scope may be voiced at the Space WARC.

The second issue raised by the Agenda is whether the Conference could decide that no space services should be "planned." Although the language of the Agenda emphasizes

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579. ITU, World Administrative Radio Conference, Geneva, 1979, Doc. No. 846-E, at 6 (Nov. 26, 1979).

580. Id.

581. Id. at 7.

planning, paragraph 2.5 indicates other approaches can be "considered."[582] At one point in the drafting of Resolution No. 3, an effort was made to insert the words "if any" at the conclusion of the paragraph calling for the Conference to "decide . . . which space services and frequency bands should be planned."[583] That initiative was unsuccessful. Nevertheless, a spokesperson from the developing countries pointed out that there was a very close link between the decision of which services and frequency bands should be planned and the consideration of other possible approaches. That link, although ambiguous, was the path through which consensus was reached on this issue at the 1979 WARC.[584]

The delegation from India was the chief proponent of Resolution No. 3 at the 1979 WARC, and its interpretation of the Resolution as it related to these issues was sought. One

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582. One author has observed that the verb "consider" is weaker than the terms "decide" and "establish", which are used in the other paragraphs of the Agenda. He concluded that:

> Resolving to "consider other possible approaches" merely stopped "guarantee in practice" from being equated with *a priori* frequency assignment. Although intended to promote the goal of flexibility in satellite regulation, the legal and linguistic structure of Resolution [No. 3 and the agenda] makes it clear that "guarantee in practice" *presumptively* means planning. Rothblatt, *supra* n. 411, at 16-17.

583. Rutkowski, *supra* n. 275, at 27.

584. *Id*.

delegate indicated that no decision on the definition of the term "planned" had to be made at that time; the forthcoming Conference would decide which services to plan and could also consider other approaches that could meet the objective of equitable access. Moreover, while he did not foresee a decision by the first session of the Conference to the effect that no *a priori* planning would be used for the space services, he stated that the Conference would have the freedom and the power "to take a decision any way it wants . . ."[585]

Due to the ambiguity of the definition of "planned" and the ability to "consider" other approaches, the Agenda provides the Space WARC with the discretion and power to examine all methods aimed at ensuring equitable access to the orbit/spectrum resource. That includes the power to decide which method to select, whether it is an *a priori* plan, or retention of the basic form of the current regulatory regime.

7.2.2 Scope of the Agenda: Specific Responsibilities

The Agenda assigns a number of specific responsibilities to the first session of the Space WARC. The threshhold responsibility is to decide which, if any, of the space

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585. *Id.*

services and frequency bands should be "planned" or subjected to other methods of guaranteeing equitable access.[586] Based on this decision, other actions must be taken.

For the bands and frequencies that are not identified for planning, the Conference must establish guidelines for regulatory procedures "as necessary".[587] Since they were not identified for planning, any regulatory procedures established would not be expected to be similar to the detailed nature of a plan, nor would they be expected to significantly change the existing regulatory regime. Nevertheless, some changes to the current regime may be made for the services and frequencies that are not planned.

For the bands and frequencies that are identified for planning, the Conference must establish "principles, technical parameters and criteria" as well as "guidelines for associated regulatory procedures."[588] This involves the selection of a planning method, and should be "the key issue of the Space WARC

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586. Agenda, supra n. 139, para. 2.2 & 2.5. In the remainder of this Chapter, when the term "plan" is used, it is used in its widest sense and is intended to encompass all forms of a priori planning and other methods of ensuring equitable access which have been discussed. See supra Chapter 5.

587. Id. para. 2.4.

588. Agenda, supra n. 139, para. 2.3.

first session."[589] Although the seven proposals examined by the CCIR[590] *do* not limit the options of the Space WARC, they have been studied in the most detail, and it is likely that the planning method chosen will be similar to one of those methods, or a combination of various aspects taken from several of them. Given the wide variety of proposed methods, it will be a challenge for the delegates "to find a middle ground that satisfies their common needs and aspirations."[591]

For planned bands and services, the Conference must also "specify the form in which requirements of administrations . . . should be submitted" and the date for submission.[592] The date should allow administrations sufficient time to formulate their requirements. The "form" for requirements should include at least the technical parameters which will be encompassed in the plan; it could also include information such as the estimated date of bringing into service, and criteria upon which the validity of the stated requirement could be established.[593]

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589. Kimball, supra n. 21, at 5.

590. See supra Section 5.2

591. Kimball, supra n. 21, at 5.

592. Agenda, supra n. 139, para. 5.1.

593. But countries are unlikely to subject their stated requirements to scrutiny. See supra n. 433.

Another responsibility of the Conference is to identify bands "for which sharing criteria between services (space or terrestrial) need to be developed . . ."[594] The criteria are to be developed before the second session and considered at that session. Sharing criteria will be needed for any bands which are planned.[595]

7.3 Agenda Provisions Related to the Plans for the BSS

Several Agenda items relate to the Plans already established for the broadcasting satellite service. Paragraph three of the Agenda involves the 1977 Plan for the BSS. Feeder links (uplinks) for the BSS in Regions 1 and 3 have not been planned. Resolution 101 of the 1979 WARC identified bands

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594. Agenda, _supra_ n. 139, para. 2.6.

595. It is likely that any planned bands will require sharing criteria for terrestrial as well as space services, since most frequencies for space services are on a shared basis with terrestrial services. 1982 Radio Regulations, _supra_ n. 1, Art. 8. Potential interference between planned services and subsequently established terrestrial stations using the same bands will need to be considered.

which were available for that purpose.[596] The Space WARC is to select which of those bands should be used for feeder links and define the technical characteristics most suitable for them.[597] Of the bands selected, the WARC is to determine those bands "for which sharing criteria between services (space or terrestrial) need to be developed . . ." prior to session two of the WARC.[598]

The 1983 BSS Plan for region 2 is also on the Space WARC Agenda. Final Acts are to be adopted which incorporate the decisions of the 1983 RARC into the Radio Regulations.[599] Since the 1983 RARC already planned the feeder links for region 2, the Space WARC does not have to take action in that regard.[600]

Two issues not specifically mentioned on the Agenda should receive attention. The first is the problem of inter-region downlink interference. In areas of the world where ITU regions border each other, interference could occur in one region as a

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596. 1982 Radio Regulations, supra n. 1, Resolution 101.

597. Agenda, supra n. 139, para. 3.1 & 3.2.

598. Id. para. 3.3.

599. Agenda, supra n. 139, para. 6.

600. Since the feeder link plan for Regions 1 and 3 will not be incorporated into the Regulations until the second session in 1988, it is possible the Conference will opt to delay incorporating the feeder link for Region 2 until that date as well. DuCharme, Irwin, Zeitoun, supra n. 344, at ___.

result of a BSS transmission to another. The IFRB has been studying this issue.[601] The second issue involves the relationship of planned services to unplanned services that share the same frequency bands. The frequency bands for BSS downlinks, for example, are shared with other space and terrestrial services.[602] The Radio Regulations, however, are silent regarding sharing criteria. The potential exists that a BSS station operating in accordance with a Plan may cause interference to a terrestrial station which was recorded in the Master Register prior to the Plan. These issues should be addressed by the WARC. Although they are not specifically mentioned in the Conference Agenda, it appears sufficiently broad to permit their examination.[603]

The Agenda also includes a provision for sound BSS. The specific needs of satellite sound broadcasting serving portable and mobile receivers, such as automobile receivers, are not provided for by current frequency allocations. The Conference

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601. One example of the problem of inter-region interference is the U.S. - USSR situation. Projected BSS service to Alaska may result in interference to terrestrial television systems in eastern Siberia. See U.S. RARC Report, supra n. 373, at 33.

602. See 1982 Radio Regulations, supra n. 1, Art. 8.

603. These issues could fall within the provision of paragraph 2 to "identify those bands for which sharing criteria between services (space or terrestrial) need to be developed during the intersessional period for consideration at the second session." Agenda, supra n. 139, para 2.6.

is to examine this issue in light of CCIR studies and experience of administrations, and make recommendations.[604]

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604. *Id*. para. 4.

Chapter 8

CONCLUSION

The key to success at the Space WARC lies in the ability of developed and developing countries to understand and deal with the needs and concerns of the other group. Developed nations must accept that advancing technology does not hold all of the answers. Statistics which show that technology will provide ample capacity in the orbit/spectrum resource for the remainder of the century do not address the special needs of the developing countries. Their needs are primarily for use of the C band, which will be little affected by technological advancement, and for use in a manner which may not be the most efficient. Moreover, their needs may not be present immediately, but deserve protection for the future. Some form of advance planning is warranted to protect those needs.

The developing nations, on the other hand, must realize that rigid, long-term plans similar to the 1977 BSS Plan, have serious drawbacks and would benefit few nations. Such plans would retard the advance of technology and result in a waste of the orbit/spectrum resource. The developing nations have benefited from the many advances that have been made in telecommunications technology, and they should not take actions which could considerably retard future advancement. Therefore, the developing nations should accept a planning approach that is based on sound engineering principles, is efficient, and will permit growth of technology.

Provided this understanding by both groups materializes, the threshhold issue of the Space WARC -- which services and bands to plan, should be resolved without serious difficulty. The fixed satellite service, and the C and possibly Ku band are the prime candidates for planning. The difficult issue will be the method of planning to adopt and the detailed technical parameters, criteria and procedures to guarantee equitable access.

Assuming that the fixed satellite service and the C and Ku bands are identified for planning, impairment of technological advancement should not be a great problem. The technology involved is well-developed and is not expected to change rapidly. Nevertheless, flexibility should be built into the plan to allow for long-term technological advancements that may develop.

To provide for long-term technological advancement and promote accurate projection of needs, any planning method adopted at the Conference should be for a duration less than ten years. That time frame is attuned to current satellite life expectancy and would permit technological advances to be incorporated in Plan criteria at reasonably appropriate periods. It is also short enough that the requirements submitted by nations could be based upon realistic projections. This consideration is extremely important. If states submit inflated requirements, any planning method chosen will result in a waste of resources.

In addition to a plan, other changes to the current regulatory regime should be considered for services and bands which are not planned. Some of the concerns expressed by developing countries could be alleviated merely by setting a time-limit for registered assignments. This would retain the procedures of the first-come, first-served regime, but limit the protection granted an assignment to a specific period. The potentially permanent nature of that regime would be eliminated. Moreover, as long as the period of protection equaled the satellite life expectancy, the legitimate concerns of owners for cost recovery would be met.

The Space WARC should also examine the standing of common user organizations within the current regulatory regime and any planning regime established. Such organizations offer the best potential for the vast majority of developing nations to secure the benefits of domestic satellite telecommunications. Several steps could be taken by the Space WARC to enhance the development of common user organizations. The first step that should be taken is to create an associate membership category in the ITU for common user organizations.[605] Associate membership would allow direct representation of these organizations in the ITU.[606] At a minimum, common user organizations should be granted direct representation in any conferences which implement plans and they should be able to directly submit their requirements to the ITU for planning. Any plan should also consider giving priority to the requirements of common user organizations, and should reserve ample orbit/spectrum resource for current common user organizations and for those that may be formed in the future.

Planning options for the Space WARC are primarily constrained by technical and policy matters, legal constraints are secondary. The broad and general principles of international

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605. For a further analysis of this proposal see Jakhu, supra n. 86, at 221-27. The scope of "common user organizations" would have to be carefully defined. It should not include systems that are owned and operated by one nation.

This step would require amendment of the ITU Convention, which is beyond the scope of the Space WARC's powers. However, appropriate Recommendations could be adopted for action at the next Plenipotentiary Conference.

606. Such action may be opposed by certain nations that have had problems with common user organizations in coordinating their domestic satellites, but could receive significant support from nations which have no realistic requirement for a satellite system of their own.

space law are not specifically directed at space telecommunications. Although continued application of the first-come, first-served rule may pose problems in the future, the current regulatory regimes do not violate any provisions of space law. Additionally, the methods of guaranteeing equitable access that have been examined by the CCIR do not raise significant issues of space law. Certain aspects of some of the other proposed methods, however, would require further examination if considered at the Space WARC.

The regulatory regimes which currently exist for space services are established elements of telecommunications law. Since most of the proposed methods of guaranteeing equitable access fall somewhere between the extremes of the 1977 BSS Plan and the first-come, first-served regime, they do not raise significant issues of telecommunication law. The most significant legal constraint on the Space WARC is the mandate that any method selected by the Conference must guarantee "equitable access" to the geostationary orbit/spectrum resource for all countries. The definition of "equitable access", however, is very broad. It encompasses all relevant circumstances. These include: the special needs of developing countries, geographical conditions, needs of other countries, ability to use, and the existence of current users.

The delegates to the Space WARC will have the difficult task of transforming the general criteria of equitable access into specific rules and regulations that will guarantee equitable access. That should be the true challenge of the Space WARC. Nevertheless, it is a challenge that can be met if the developed and developing countries make the effort to understand and deal with the needs and concerns of the other group.

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APPENDIX A

R. No. 895 WORLD ADMINISTRATIVE RADIO CONFERENCE ON THE USE OF THE GEOSTATIONARY-SATELLITE ORBIT AND THE PLANNING OF SPACE SERVICES UTILIZING IT

The Administrative Council,

noting

a) that Resolution No. 3 of WARC-79 invited the Administrative Council to take the necessary steps to convene a world space administrative radio conference with the essential objective to guarantee in practice, for all countries, equitable access to the geostationary-satellite orbit and to the frequency bands allocated to the space services utilizing it and that this conference be held in two sessions;

b) that the Plenipotentiary Conference, Nairobi, 1982, in its Resolution No. 1, decided that the Administrative Council, at its 1983 session, when establishing the agenda for the First Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It shall be guided by the relevant Resolutions of the 1979 World Administrative Radio Conference;

c) that in its Resolution No. 8 the Plenipotentiary Conference, Nairobi, 1982, instructed the Administrative Council to examine the question of feeder links with a view to including in the agenda of the First Session of the World Administrative Space Radio Conference scheduled for 1985 the planning of the bands allocated to the fixed-satellite service and reserved exclusively for feeder links for the broadcasting-satellite service and to instruct the IFRB accordingly;

considering

a) that the CCIR has undertaken preparatory studies in accordance with Resolution No. 3 of WARC-79 in order to provide the First Session of the Conference with technical information concerning principles, criteria and technical parameters including those required for planning space services;

b) that the IFRB is required to prepare a report, in accordance with Resolution No. 3 of WARC-79, on the operation of the procedures of Articles 11 and 13 including information about difficulties which may be reported to the IFRB by administrations in gaining access to suitable orbital locations and frequencies, and to circulate this report to administrations at least one year before the First Session of the Conference;

c) that in the use of the geostationary-satellite orbit for space services attention should be given to the relevant aspects concerning the special geographical situation of particular countries;

considering further

d) that in accordance with Resolution No. 1 of the Plenipotentiary conference, Nairobi, 1982, the agenda of this First Session should also contain the formal adoption, for inclusion in the Radio Regulations, of the relevant decisions of the 1983 Regional Administrative Conference for the Planning of the Broadcasting-Satellite Service in Region 2;

e) Resolution No. 505 of WARC-79 Relating to the Broadcasting-Satellite Service (Sound) in the Frequency Range 0.5 GHz to 2 GHz;

f) the results of the consultation conducted by circular telegrams Nos. A475 to A481 of 9 May 1983 and No. A482 of 12 May 1983;

recognizing

a) that the planning principles to be developed by the Conference should provide for flexibility to respond to the changing needs of services and advances of technology;

b) that some of the bands are allocated on a shared basis with equal rights to more than one space service and that most of them are also allocated with equal rights to terrestrial services and that these rights must be taken into account during the development of any planning approach;

decides

1. that the First Session shall be convened in Geneva on 8 August 1985 for a duration of five and a half weeks,

2. that in order to meet the objectives of noting a) the First Session shall:

   2.1 review the situation prevailing in the bands allocated to space services on the basis of:

   - information communicated by administrations,

   - a report to be prepared by the IFRB in accordance with Resolution No. 3 of WARC-79;

   2.2 decide on the basis of proposals received from administrations, which space services and frequency bands should be planned;

   2.3 establish the principles, technical parameters and criteria for the planning, including those for orbit and frequency assignments of the space services and frequency bands identified as per paragraph 2.2, taking into account the relevant technical aspects concerning the special geographical situation of particular countries; and provide guidelines for associated regulatory procedures;

   2.4 establish, as necessary, guidelines for the regulatory procedures pertaining to space services and frequency bands which have not been identified in accordance with paragraph 2.2;

2.5 consider other possible approaches that could meet the objective of noting a);

2.6 identify those bands for which sharing criteria between services (space or terrestrial) need to be developed during the intersessional period for consideration at the second session.

3. In order to meet the objectives of Resolution No. 8 of the Plenipotentiary Conference, Nairobi, 1982, the First Session shall:

3.1 select from among the frequency bands listed in resolves 1 of Resolution No. 101 of WARC-79 those bands for which frequency plans should be established for feeder links;

3.2 define the most suitable technical characteristics for the feeder links to broadcasting satellites, taking into consideration the CCIR studies pursuant to Resolution No. 101 and Recommendation No. 101 of WARC-79 and, if appropriate, taking account of the requirements of the space operation service for broadcasting satellites;

3.3 identify those bands, selected in accordance with paragraph 3.1, for which sharing criteria between services (space or terrestrial) need to be developed during the intersessional period for consideration at the Second Session.

4. In order to meet the objectives of Resolution No. 505 of WARC-79, the First Session shall consider the question in the light of experience gained by administrations and the results of studies in the CCIR and make appropriate recommendations for the attention of the Second Session.

5. The First Session shall also:

5.1 specify the form in which the requirements of administrations, for the services and frequency bands indicated in item 2.2 above, should be submitted to the Union, and indicate the desirable date for this submission;

5.2 specify the preparatory actions required to be completed before the commencement of the Second Session of the Conference;

5.3 recommend a draft agenda for the Second Session of the Conference for consideration by the Administrative Council;

5.4 evaluate the financial impact of its decisions upon the budget of the Union in accordance with No.556B and other pertinent provisions of the Nairobi Convention;

decides further

6. that in order to meet the objectives of decides 2.3 of Resolution No. 1 of the Plenipotentiary Conference, Nairobi, 1982, and Resolution No. 504 of WARC-79 the First Session shall:

6.1 consider the relevant decisions of the Regional Administrative Radio Conference for the Planning of the Broadcasting-Satellite Service in Region 2 and incorporate these decisions in the Radio Regulations, as appropriate, revising the Radio Regulations only for these purposes as necessary;

6.2 adopt appropriate final acts to achieve this objective;

invites the CCIR to complete the necessary studies for the First Session of the Conference in accordance with Resolution No. 3 of the WARC-79 so that they may be available to administrations approximately ten months prior to the opening of the Conference;

invites the IFRB

1. to prepare a report on the operation of the procedures of Articles 11 and 13 including information about difficulties which may be reported to the IFRB by administrations in gaining access to suitable orbital locations and frequencies, and to circulate this report to administrations at least one year before the First Session of the Conference;

2. to carry out technical preparations for the Conference in accordance with the provisions of the Radio Regulations;

invites the Secretary-General to make the necessary arrangements for the convening of the First Session of the Conference.

RESOLUTION No. 3

Relating to the Use of the Geostationary-Satellite Orbit and to the Planning of Space Services Utilizing It

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the geostationary-satellite orbit and the radio frequency spectrum are limited natural resources and are utilized by space services;

b) that there is a need for equitable access to, and efficient and economical use of, these resources by all countries as provided for in Article 33 of the International Telecommunication Convention (Malaga-Torremolinos, 1973) and Resolution 2;

c) that the utilization of radio frequencies and the geostationary-satellite orbit by individual countries and groups of countries can take place at various points in time, based on their requirements and the availability of the resources at their disposal;

d) that there are growing requirements all over the world for orbital position and frequency assignments for the space services;

e) that in the use of the geostationary-satellite orbit for space services, attention should be given to the relevant technical aspects concerning the special geographical situation of particular countries;

resolves

1. that a world space administrative radio conference shall be convened not later than 1984 to guarantee in practice for all countries equitable access to the geostationary-satellite orbit and the frequency bands allocated to space services;

2. that this conference shall be held in two sessions;

3. that the first session shall:

3.1 decide which space services and frequency bands should be planned;

3.2 establish the principles, technical parameters and criteria for the planning, including those for orbit and frequency assignments of the space services and frequency bands identified as per paragraph 3.1, taking into account the relevant technical aspects concerning the special geographical situation of particular countries; and provide guidelines for associated regulatory procedures;

3.3 establish guidelines for regulatory procedures in respect of services and frequency bands not covered by paragraph 3.2;

3.4 consider other possible approaches that could meet the objective of *resolves* 1;

4. that the second session shall be held not sooner than twelve months and not later than eighteen months after the first session and implement the decisions taken at the first session;

invites

1. *the CCIR* to carry out preparatory studies and provide the first session of the conference with technical information concerning principles, criteria and technical parameters including those required for planning space services;

2. *the IFRB* to prepare a report on the operation of the procedures of Articles 11 and 13 including information about difficulties which may be reported to the IFRB by administrations in gaining access to suitable orbital locations and frequencies, and to circulate this report to administrations at least one year before the first session of the conference;

3. *the IFRB* to carry out technical preparations for the conference in *accordance with the provisions of the Radio Regulations*;

4. *the administrations* to examine all aspects of the matter with a view to submitting proposals to the conference, and to cooperate actively in the above-mentioned work of the CCIR and IFRB;

5. *the Administrative Council* to take all necessary steps for the convening of the conference in accordance with this Resolution.

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